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THE FUTURE OF THE ELECTRIC VEHICLE.

The experience which has been had up to the present time with the electric vehicle in both commercial and pleasure service is sufficient to indicate what the future developments in this line must be in order to assure it the greatest success. Mistakes have been made, but every mistake, and every failure whose cause is recognized, should serve as a stepping stone to more successful efforts in the future.

With the accumulation of operating experience and operating data it is more exactly possible today than ever before to specify the type and size of vehicle which will be best suited to a particular service and hence to furnish that service with satisfaction. And it is important than this be always done. To sell the user a model which cannot meet his requirements is far worse than losing a sale. It has not only created a knocker of that particular customer, but in all probability the failure which is heralded far and wide is connected not only with that particular make of vehicle but with electric vehicles in general.

Next to the selection of a model suited to the requirements of the service, the provision of adequate garaging and charging facilities is of paramount importance. Their lack has caused the condemnation of many a vehicle. Such facilities connote expert attention and proper care and maintenance. They are absent from many private garages. The commercial electric garage, especially catering to trucks, is indicated, and is as necessary as the electric garage which cares for passenger vehicles. The charges of such a garage should be based upon services rendered, which includes a charge for electric energy on a meter basis. Facilities for repairs should be provided and this suggests as an adjunct to the public garage a machine shop. An example of such a machine shop, which accommodates outside work and is being operated successfully, is described in this issue.

Another large factor in the future success of the electric vehicle will no doubt be the system of battery exchange. This will be greatly facilitated by the standardization of cell and tray dimensions, a crying need which should soon be realized. Definite action by the Electric Vehicle Association of America will undoubtedly hasten the culmination of the movement to this end. Battery service is perhaps the most vital point of all in the operation of the electric vehicle, and the exchange system seems to offer the most feasible means of furnishing it.

A development which would accelerate the introduc-

tion of electric-vehicle service in commercial hauling would be the supply not only of batteries, but of the vehicles themselves by a central agency. Contracts could be made to supply as many vehicles as were necessary for a given company's hauling, the vehicles being owned and cared for by the central agency. No doubt such a possibility would lead to the use of electric vehicles by many concerns which think that electric vehicles are in the experimental stage and do not care to take the risk of purchase. The scheme has already been applied to gasoline automobiles with notable success in several large cities, and its adoption in the electric field would greatly stimulate the use of electric wagons, to the great advantage of both manufacturers and central stations.

FLOOD LIGHTING.

The illumination of building exteriors so as to simulate daylight appearances in an effective but economical manner has long been one of the many problems whose solution has been sought by the illuminating engineer. The development of outline lighting over 20 years ago has resulted in the production of some pleasing results of its own type, but could hardly be regarded as achieving daylight effects. To reproduce the latter realistically required throwing a flood of light upon the entire building front from a source or sources concealed or at least not conspicuously noticeable. Since sunlight illumination was the model to be copied, naturally the first attempts at what has now come to be known as flood lighting were made with searchlights or projectors. Where these can be placed advantageously so as to spread their beams uniformly over the building surface, the result is very effective.

The development of high-efficiency sources of the concentrated type during the last two years has greatly stimulated this type of lighting. Doubtless the finest example of it is that so successfully employed on a very large scale at the Panama-Pacific International Exposition. The grandeur of the effects obtainable when an imposing architectural edifice is brought into striking relief against the back-ground of the dark sky, as is done so wonderfully at San Francisco, must be very gratifying to the architect by bringing the fruits of his design more into the public eye by night than even by day.

While flood lighting is peculiarly adaptable to the illumination of large and handsome public buildings, and has been pleasingly employed in quite a number of cases of this kind, the advertising value it gives to the structure made prominent by it has naturally brought about its employment for commercial purposes and this has broadened its possibilities as a central-station load. Neglecting its use for the illumination of billboards, the flood lighting of theaters, banks and other business houses presents a fruitful field for exploitation by the wide-awake central-station company.

Commercial adaptation of flood lighting has been retarded by the fact that it has required a favorable location for the projectors needed for throwing the light upon the building front. To mount them upon opposite buildings requires the consent of their owners, which is not always obtainable for commercial purposes, and usually involves such a placing of the projecting lamps as would cause very annoying glare. An ingenious solution of this problem has been worked out by Mr. J. R. Cravath, of Chicago, and the first installation of it is described on other pages of this issue.

By this method no separately mounted projectors are required and for the projecting lamps there are used the top lamps of standard ornamental cluster posts somewhat modified for this purpose. This not only eliminates the numerous difficulties connected with the location of projectors, but utilizes advantageously the ornamental standards that have come into considerable vogue along business streets. The results achieved so successfully in this first installation are along the modern line of lighting from concealed sources, thus reducing glare to a minimum and making it possible to see the object illuminated without effort. The harmonious effect produced of illuminating an entire commercial building and the sidewalk about it without interfering with the effectiveness of electric signs and window displays is peculiarly advantageous to the merchant.

Success in a new development adaptable to commercial ends readily leads to its application without proper consideration of the requirements. In the case of flood lighting from posts at the curb, it should be noted that each installation requires careful study of the conditions prevailing, such as height, configuration and color of building, width of sidewalk, etc., else reflectors of unsuitable type or improper mounting will be used, as well as other technical points overlooked. Skillfully employed, this method of lighting a building exterior should find many applications that would not be suited to projector lighting.

IMPROVEMENT IN ELECTRICAL-EXPORT TRADE.

Much encouragement should be felt by American electrical manufacturers because the improved business conditions in the home markets are being rivaled by steady improvement in the electrical-export trade. The official export figures for July, just come to hand, disclose a larger total value of electrical shipments than for any month during the last year and a half. As compared with July of last year, which was the month just preceding the opening of the European war, the electrical total shows an increase of nearly 52 per cent. The detailed figures of the government report, as given on another page of this issue, indicate an increase in all but two of the fourteen electrical classes reported, thus showing a very gratifying general improvement.

It has been pointed out in these columns that this improvement, which has become more and more marked as the present year advanced, was due in part to heavy shipments of electrical supplies needed in prosecuting the war and in part to the necessity

confronting neutral countries, that formerly imported electrical goods from the belligerents, of buying their equipment from our manufacturers. The market created by this latter demand has placed our exporters in a peculiarly advantageous position for the time being, at least. Upon the manner in which this foreign trade is handled will depend its permanency. It is evident that every legitimate effort should be made to encourage this business to come permanently to us. This requires extension of the greatest courtesy to the foreign buyers, attention to minute details of their requests, and active cultivation of their good will.

Although the dependence of neutral countries, particularly in South America, on our products has been manifest for over a year since the war began, the increase of this commerce has not been commensurate with the expectations of either exporters or importers. At a recent meeting of commercial interests in Buenos Aires to consider the causes restricting the development of trade with the United States, it was agreed that, if American commerce is to realize its ambition of securing the Argentine market, it will be obliged to modify its methods of sale, manufacture and shipment. It is necessary to meet the customs followed by European manufacturers, who have largely controlled the South American market, of extending liberal credits to reputable purchasers, of manufacturing the products in strict accordance with the climatic and other needs of the importing country, and of making the shipments exactly as instructed. These complaints against American practice are not confined to South American purchasers.

It is conceded by those who have thoughtfully considered the subject that the European manufacturers will, at the conclusion of the war, make heroic efforts to re-establish their former extensive foreign commerce. It is undoubtedly true that they will be handicapped by heavy additional taxation, resulting from the burdens of the war. Nevertheless, they will again appear as active competitors for foreign business. In order that American manufacturers can meet their competition, they must firmly establish their reputation for fair business dealings, reliability of products and courteous attention to the susceptibilities of sensitive foreign buyers.

Price, while very important, is by no means the only consideration. In fact, in the electrical line, particularly in wiring devices, sockets, switches, etc., American products are vastly superior to much of the cheap stuff that has gutted the foreign markets. Education as to the value of this superior quality should result in creating for it an increasing demand, since the standards for quality of electrical goods are bound to be raised abroad. Electrical development in nearly all lines has been carried much further in this country than anywhere else. It is but natural, therefore, that our electrical manufacturers should have a predominant position.

MEASURING MAXIMUM DEMAND.

The cost of furnishing electric service may be divided into four parts. The first is made up of those elements which are dependent upon the consumption of energy, such as coal; the second of those independent of consumption, but dependent upon the capacity of the generating, transmitting and distributing equipment, such as fixed charges on machinery; the third of those which depend upon the number of consumers receiving service, such as meter reading; the fourth of those overhead or general expenses which do not depend definitely upon any one of the above conditions, such as legal expenses.

The relative importance of the different elements of cost varies greatly with the conditions of service. Where steam plants supply power, the first or energy cost may predominate. Where hydroelectric plants not requiring water storage supply power, the second or capacity cost may predominate. Where there are a large number of small consumers, the third or consumer cost may predominate.

A rational schedule of rates must give consideration to all of these elements. For simplicity the rate may be based on one element when it greatly predominates. If a schedule attempts to fix prices so that each consumer is charged according to the cost of serving him, it becomes necessary to determine both his consumption and the capacity of equipment necessary to serve him. The latter depends upon his maximum demand and upon the diversity-factor of his load when combined with that of other consumers.

The greatest development of central-station service in this country has taken place in localities where power is generated from fuel. Naturally in formulating charges emphasis was put on the energy consumption and the use of watt-hour meters as a basis for bills has become almost universal. Cognizance of other factors has been taken by fixing prices per kilowatt-hour dependent upon conditions of use and grouping consumers according to average conditions. Under some of the conditions mentioned above it would be much simpler to base charges upon demand. The importance of measuring maximum demand was pointed out in these columns in the issue of September 18.

The subject is brought to our attention once more by the paper presented last week by Mr. Paul M. Lincoln to the American Institute of Electrical Engineers, describing a new instrument for the measurement of maximum demand. Unfortunately the discussion was largely turned from the subject of measuring demand to the question of using demand meters by the inappropriate title of the paper. Mr. Lincoln's device has the merit of being influenced by the load in the same manner as the electrical equipment used to supply power, and this feature should commend it for the purpose intended. The industry will await with interest the commercial production and operation of the new type of meter. Not until then can proper comparisons with other types be made. A satisfactory and cheap type of demand meter having the characteristics stated will be eagerly welcomed.

Jovian Convention Opens in Chicago.

The registration of Jovians from outlying points on the first day of the annual convention of the Jovian Order at the Hotel Sherman, Chicago, Wednesday, October 13, indicated that all previous attendance records would be eclipsed by the current meeting. At an early hour 412 had registered, this figure not including the heavy local registration which is expected before the close of the convention.

A fitting reception to the visiting delegates was tendered by business interests of Chicago in the form of a complimentary luncheon on Wednesday noon under the auspices of the Chicago Association of Commerce at the Hotel La Salle. A stirring address was delivered by Dr. Frank W. Gunsaulus, president of Armour Institute of Technology, in which tribute was paid to the contributions of the electrical industry in benefiting mankind.

The opening business session was held on Wednesday afternoon, Reigning Jupiter Homer E. Niesz extending a cordial welcome to the thirteenth convention. City Prosecutor Miller, of Chicago, represented Mayor William Hale Thompson in extending the hospitalities of the city and an eloquent response was made on behalf of the Jovian Order by Henry W. Kiel, mayor of St. Louis.

Henry Harris, of Pittsburgh, then took the chair and presided at the remaining sessions. The report of Mercury Ell C. Bennett presented at the opening session reviewed in detail the work which has been accomplished during the past year and embodied suggestions for future activities. The most important feature of Jovian work is embodied in the activities of the Jovian leagues throughout the country, there now being 72 such organizations. In many instances these local organizations have been active in promoting a wider use of electricity and in gaining the co-operation of the various allied interests. Mention was made of house-wiring campaigns, co-operative electrical shows, etc., which have been carried on during the past year in numerous localities under the auspices of the Jovian Order. There is a vast field for further work in this direction.

Regarding membership it was pointed out that while the aim of the administration has not been to break previous records in candidates initiated, there has nevertheless been a net gain during the thirteenth administration of 1,231, making the total membership to date of 16,147.

The report deals at some length with the classification of this membership and the part that various officers and individuals played in securing the increase.

Reference was made to Electrical Prosperity Week and the part which the Jovian Order can take in making it a success. Many of the local leagues have formulated definite plans for participating in co-operation with other local organizations. It is pointed out that Jovian Day can be designated as a time when similar activity can be promulgated annually hereafter.

The work of the Commercial Division of the Order was reviewed and the possibilities in this direction emphasized. The Efficiency Campaign inaugurated shortly after the annual convention last year has been productive of good results and the articles dealing with various efficiency ideas submitted in a contest conducted by the Order contain a wealth of suggestions for improving efficiency in many directions. These articles will be printed in pamphlet form for general distribution. Another activity of the Commercial Division has been the establishment of an employment bureau which is operated without expense to either the employer or employee. Work is actively progressing on the standardization of electric shows and when completed will enable local Jovian organizations, central stations, or others interested, to conduct an exhibition on a modest scale that will stimulate interest in things electrical and at the same time be made self-supporting. Other plans which have been considered and which will be carried out as time and funds permit include the working for the co-operation of architects in providing suitable electrical facilities in buildings; the preparation of publicity matter which will be at the disposal of all interested in furthering the use of electricity; and the establishment of correspondence courses for those desiring an elementary course of instructions in various branches of electrical work. The degree of Vulcan which was created primarily to insure funds for the carrying out of the work of the Commercial Division is meeting with favor and it is expected that during the coming year these funds will enable the Order to carry out the proposed work in a complete manner.

On Wednesday evening an informal reception and dance was held at the Hotel Sherman, the program including exhibitions of dancing by professionals and a concert by the Commonwealth Edison orchestra of 150 pieces.

A complete report of the remaining sessions will be given in our next issue.

Independent Telephone Convention in San Francisco.

A convention of the Independent Telephone Association of America, which is expected to be national in scope, is to be held at San Francisco, Cal., on October 26 to 29. This will be the first national independent telephone meeting ever held on the Pacific Coast. Addresses will be made by leaders in the movement, among whom will be E. B. Fisher, of Grand Rapids, Mich.; C. E. Summer, San Diego, Cal.; A. Schuler, Santa Barbara, Cal.; T. H. Gould, Redondo Beach, Cal.; A. Wardman, Whittier, Cal.; E. P. Morphy, Redlands, Cal., and C. A. Rolfe, Redlands, Cal.

Commonwealth Edison Company Orders 30,000-Kilowatt Unit.

The Commonwealth Edison Company has just placed an order with the Westinghouse Electric & Manufacturing Company for a 35,300-kilovolt-ampere turbo-alternator which is to be installed at Northwest station. The new unit will be rated at 30,000 kilowatts at 85 per cent power-factor, three-phase, 60 cycles, 12,000 volts, and it is said will embody many novel features.

The turbine is of the Parsons type, tandem compound, direct-connected to a single generator. The turbine is designed for a 250-pound steam pressure and 29-inch vacuum. A direct-connected exciter unit will be provided as also a separate motor-driven blower equipment for supplying cooling air. This will be installed in the air inlet duct.

The entire unit will be 75 feet long, 18 feet 6 inches wide and will measure 21 feet at its highest point.

In the new unit use will be made for the first time of micarta folium insulation. The unit will therefore be guaranteed to stand a temperature of 150 degrees centigrade in continuous operation.

The company expects to have the unit in operation by the fall of 1916.

Another Postponement of the Washington Conference on Safety Code.

The Bureau of Standards announces the postponement of the conference that was to meet at Washington on October 27 and 28, until a date to be announced later. This sudden change of plans is due to the urgent request of the National Electric Light Association, the American Institute of Electrical Engineers, and the Association of Edison Iluminating Companies, that additional time be granted for the consideration of the code of rules that has been formulated by the Bureau before they are submitted to a formal conference.

The engineering societies requesting the postponement have given the Bureau assurance of prompt and active co-operation and every effort will be made to complete the work at an early date.

The Bureau regrets the inconvenience to many delegates caused by a postponement at so late a date, but believes that the issues at stake are so great and the results obtainable by the expenditure of further time and effort are likely to be so much more satisfactory under the circumstances than would have been possible otherwise, as to fully justify whatever inconvenience and confusion will be caused by the further postponement of the conference.

THE ELECTRIC VEHICLE ASSOCIATION OF AMERICA.

Its Influence on the Present and Future Development of the Industry.

With all the merit that the electric vehicle possesses to warrant its employment as a domestic convenience by the average well-to-do family, and in the commercial field as the cheapest and most expeditious conveyance yet devised, there nevertheless has been, and still is, a need for comprehensive co-operative work on the part of the various allied interests if the industry is to achieve the success to which it is legitimately entitled.

One of the underlying requirements in the industry has been the need for a proper appreciation on the part of the separate interests that comprise the business as a whole, of the position each holds with respect to future developments. It was early realized that co-operation between the electric-vehicle manufacturers and the central stations was essential to the success of the business, but it was difficult to establish a common basis for the discussion of problems of mutual interest. The manufacturers were prone to place the responsibility for the success of the business upon the central stations, expecting perhaps that the same assistance would be given as is true in the motor or electric appliance business. The central stations, on the other hand, were slow in realizing the immense possibilities of the battery-charging load and were skeptical regarding the merits of the electric vehicle.

Another most important need upon which the success of the electric-vehicle industry hinges is that of educating the public. The electric, in its present efficient state, is a comparatively new development, although the origin of the battery vehicle dates back many years, and like other fields of commercial endeavor, where the introduction of new methods or improved equipment becomes a problem, the impediments of novelty must be brushed aside and the facts presented in a clear and concise manner.

Such co-operative work lies clearly within the province of the Electric Vehicle Association of America, and to its influence in bringing about a better understanding of the relations that should exist between the central stations, the manufacturers, the garages and the public, is due a large share of the credit for the present development of the business.

This remarkably active association, which has 14 branches in as many important cities throughout the country, is a tremendously powerful ally to the industry. The various branches hold weekly and monthly meetings, in addition to the annual meeting of the parent body, at which papers are read on the more important aspects of the business, and at which methods are planned and carried out for increasing the use of electric vehicles. All of which means that the Association is no academic body of merely philosophical enthusiasts, but rather an energetically determined body of men bent on pushing, and, moreover, forcing the electric into the front-rank position they think it should hold.

Although the millennium has by no means been reached, there is today, fortunately, a better understanding of the importance of the field, and a more pronounced tendency towards real co-operation. From the standpoint of the electric-vehicle manufacturer the principal objects to be attained through co-operation are greater satisfaction among vehicle users, reduction of operating difficulties, and consequent increased sales, and also vehicle sales, made possible by the good example established in the use of vehicles by the electric service companies, and because the service companies are in a position to advise the manufacturers of live prospects for the purchase of vehicles.

From the standpoint of the central station the advantages to be realized are the promotion of the sale of electricity, thereby increasing revenue; improved operating conditions, that is through obtaining a considerable off-peak charging business the central-station load-factor is improved and the cost of production reduced; advertising, the service company feels that every electrically operated machine, be it an automobile or a buzz-saw, is an advertisement instrumental in bringing new customers to its lines; furthering the interests of the industrial and social progress of the communities in which the central-station company operates, for any improvement in civic welfare is ultimately reflected to the service

A PROPHECY—BY PRESIDENT GILCHRIST.

The study of the evolution of the various major pieces of electrical apparatus and the conquest of industrial, commercial and domestic situations by this apparatus is one of absorbing interest. Electric illumination has all but crowded out other illuminants wherever electricity is obtainable. The stationary electric motor has had an easy victory over both the steam and the gas engine. In the case of vertical transportation in the modern sky-scrapers, various types of hydraulic and steam methods of propulsion, which a few years ago seemed to be so thoroughly intrenched that no adaptation of electricity would ever be able to supplant them, have, after a stubborn resistance, given way until today well-informed experts, regardless of their former favorites, unanimously admit that the electric method, which for so many years of its development period seemed doomed to failure, is without question, the superior of all methods, both mechanically and economically; and this leads us to the consideration of the electric idea as applied to vehicle transportation.

The development of the gasoline engine for such service has been one of the world's wonders; but in this field also the electric has taken a firm hold, and slowly but surely it has forced upon the attention of the industry the absolute superiority of service whcih it makes possible. In the development of the electric-vehicle industry many great businesses are brought into consideration. The manufacturers of vehicles, of electric machinery, of electric storage batteries, rubber tires, and finally, the electric utilities which provide for the charging of the vehicles are all vitally interested. This situation has led to the formation of the Electric Vehicle Association of America, enrolling on an equal footing the representatives of these interested industries, and through its organization various constructive work is being done for the furthering of the mutual interest. The electric-vehicle industry is destined to be one of the greatest industries of the century.

company, either in improved surroundings and aesthetic betterment, or in good round dollars.

The public, too, is being educated to the many inherent advantages of the electric vehicle, and the co-operation which developed in the Electric Vehicle Association made possible an educational advertising campaign which has had inestimable influence in this direction.

In reviewing the important work which has been done by the Association it is significant to note that all has been accomplished within a space of six years.

The Electric Vehicle Association of America was the outgrowth of an electric-vehicle promotion organization, created in Boston in 1909. The Association was originally termed "The Electric Vehicle and the Central Station." The first organization meeting and convention of the Association was held in Boston in the Edison Auditorium of the Edison Electric Illuminating Company, October 17, 1910. The membership at that time was about 50.

The second convention was held in New York City, October 10, 1911, with W. H. Blood, Jr., president. The membership at that time was about 200. At

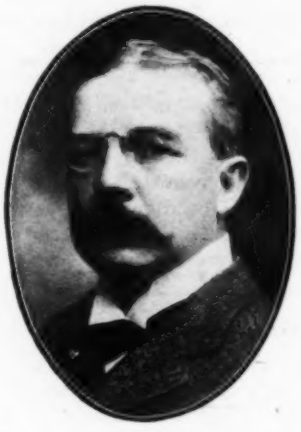
H. W. Johnson,
Vice-president.

this convention there was a report of general progress by the president, and reports from various Committees on Education, Standardization, Membership, Transportation, etc., and comprehensive papers by E. W. Curtis, Jr., W. E. Holland, S. C. Harris, etc.

The third annual convention was held at Boston, Mass., October 8 and 9, 1912. The membership at this time had increased to 335, and the convention was considered successful from every standpoint. During this year the Chicago Section was created, this being the second branch of the Association.

At the fourth convention, held in Chicago, October 27 and 28, the membership was announced as 429. President Arthur Williams, in his presidential address, forcibly called attention to the necessity of central-station co-operation and at this convention the greatest stress was laid upon this phase of the problem of vehicle development.

The fifth convention, held at Philadelphia, on October 19, 20 and 21, 1914,



H. M. Edwards,
Treasurer.

was notable in many ways. The increasing influence of the Association was reflected in the number of members secured during the year, and also in the increasing of the influence of the Association by the establishment of 12 additional sections. At the close of the convention the membership had reached the high total of 885, a gain of 456 for the year.

At the sixth annual convention in Cleveland, October 18 and 19, it is expected that the membership will have reached the 1,000 mark and the formation of two additional sections will be announced.

The work of the Association is largely carried on by committees, which work continuously for the good of the industry. Among the more important of these may be mentioned the following:

Committee on Garage and Rates, which has obtained an index of garage conditions and rates throughout the country, and at the 1914 convention presented a comprehensive report indicating electric-vehicle charging facilities along the route of the Lincoln Highway.

The Committee on Insurance has been instrumental in securing a ruling whereby many of the fire-insurance companies have given a reduction of 15 per cent from standard automobile rates where electric vehicles were properly equipped with suitable fire extinguishers.

The Committee on Legislation has co-operated with various interests in an effort to secure for the electric vehicle due consideration in legislative matters.

The Committee on Educational Courses has under preparation electric-vehicle courses which may be included in the curriculum of colleges, and which may, with modifications, be employed by vehicle manufacturers and central stations.

The Committee on Standardization has been responsible for needed standardized practice, and has co-operated with the Standardization Committee of the Society of Automobile Engineers, which action will further assure electric vehicle recognition in the broad motor field.

The Committee on Traffic has been working largely with the Citizens' Street Traffic Committee of New York and elsewhere in effecting desirable traffic regulations.

The Committee on Central Station Co-operation, lately appointed, has been investigating the relations of central stations and manufacturers in the sale and use of electric vehicles with a view to promoting the interests of all concerned.

The Committee on Good Roads has been obtaining an index on the road situation throughout the country, also lending any aid possible in furthering good-road development.

A. J. Marshall,
Executive Secretary.

The Committee on Parcel Post Delivery has conducted a very extensive investigation of the parcel-post delivery field, and has waged an aggressive campaign to insure the recognition of the electric vehicle by the postal authorities and others concerned.

The Committee on Publicity has had charge of the very successful advertising campaign, which was discontinued about February 1, last year, the remaining funds being applied to the operating expenses of the general office.

The Committee on Motion Pictures arranges for the production and distribution of films featuring electric vehicles.

In order to further aid, in a concrete way, the promotion of the sale and use

of electric vehicles, the Association has established a permanent office, in New York City, in charge of an executive secretary. Here facilities are provided to aid manufacturers and central stations in promotion work, to compile special lists and data for members, prepare publicity articles for publication in newspapers, magazines, etc., establish vehicle bureaus for central stations, develop foreign trade relations, prepare lectures, advertising matter, etc., and to otherwise promote the use and sale of vehicles and assist members in this work.

Section Activities.

The greatest influence of the Association on the development of the electric-vehicle industry is, of course, extended through the activities of the various Sections. These are now established at New England, Chicago, Philadelphia, Washington, Cincinnati, San Francisco, Los Angeles, Pittsburgh, New York, Detroit, Cleveland, Toronto, Denver, St. Louis, Kansas City and Portland, and still others are contemplated.

The work which is being done and can be done in the future by the sections to aid in promoting the use and sale of electrics is practically unlimited. As is true of the parent body, committees carry on the important work of the year, although the periodic meetings that are held enable all problems to be discussed by all members.

J. W. McDowell,
Chairman, Chicago Section.

L. D. Gibbs,
Chairman, New England Section.

R. L. Lloyd,
Chairman, Philadelphia Section.

Chicago Section.

The work which can be done by the various local Sections is best illustrated by a brief account of the activities of the Chicago Section, the second to be established. Meetings are held weekly, at which topics of general interest are discussed. Occasionally a special program that will appeal directly to the user or prospective user is arranged, and an effort is made to have an attendance of this character at these times. The underlying purpose of all of these meeting is to bring the various elements of the vehicle industry together so that they will understand each other and work in harmony to boost the electric in every way possible.

Committee work also forms an important part of the Section's activities, and all local problems are handled in this manner. For instance, the increasing congestion in the downtown district made necessary during the year a city ordinance prohibiting the parking of vehicles for longer periods than one-half hour. The effect of this law was to materially reduce the utility of the electric passenger car. The question was referred to the Garage Committee of the Section, with the result that parking stations were established at prominent points in the business district, where owners can leave their cars, in charge of competent attendants, who drive them to the parking space outside the restricted area and return them to the stations at any time specified. This service is free to owners, and is financed by voluntary contributions from garage owners and dealers. Results indicate that the service is going to be a great help in the sale of electric passenger cars, and it will have a direct influence in keeping them in use more than if such service did not exist. The Garage Committee also does important work in striving to gain the fullest cooperation between garages, dealers and central station.

All matters relating to traffic and traffic regulations and street and road improvements are handled by a traffic committee, which keeps closely in touch with all pending legislation, and also gives advice and information to users. Recently this committee sent to all electric vehicle owners in the city a communication explaining the ordinance relative to slow-moving vehicles and their use of the streets.

The Standardization Committee also plays an important part in local activities. A report of this committee dealing with the standardization of size of cells, assembly of cells in a tray and number of cells per battery, will, it is believed, be acted upon by the parent association. Standardization of practice is also considered by this committee.

While the Section as a whole may be considered as a publicity committee there are special functions, such as arranging for electric vehicle runs, participation in civic parades, etc., that occupy the attention of a special committee.

These are just a few of the many activities that logically come within the scope of the Section, and serve to illustrate the important field that must be covered if the electric vehicle is to enjoy the prominent position in transportation which it deserves.

The Chicago Section was organized in May of 1912, with George H. Jones, of the Commonwealth Edison Company, as chairman, and W. J. McDowell as secretary. In 1913 Homer E. Niesz was elected chairman and Mr. McDowell continued as secretary. For the fiscal year which ended October 5 Mr. McDowell acted as chairman, with F. E. McCall secretary.

Brief accounts of the activities of some of the other Sections follow.

New England Section.

The original society, Electric Vehicle and Central Station Association, was organized in Boston on March 11, 1909, and was run for some time as a local organization, although it included representatives from other parts of the country. After running for several months it was thought best to enlarge its scope to become national in its character, and its successor, "Electric Vehicle Association of America," was organized in New York on June 29, 1910.

The Electric Vehicle and Central Station Association continued its independent existence until April 17, 1911, when it was merged into the New England Section of the Electric Vehicle Association, and became its first Section, working under a constitution which had been approved by the parent association.

For a period dating from April 17, 1911, the New England Section has worked in connection with other electrical clubs and associations in this section to further the interests of the electric vehicle from the standpoint of all the different interests, and has held a number of very interesting meetings at which papers on live topics have been presented and very interesting discussions maintained.

The Electric Vehicle Club, which has

E. S. Marlow,
Chairman, Washington Section.

been closely allied with the Section, has done a great deal of active work in and about Boston, tending to increase the number of charging stations, to increase the parking and other road facilities, to attempt to get legislation favorable to the electric vehicle, and has also carried on electric-vehicle shows and local conventions in the interests of the electric vehicle.

The officers have been elected annually, and the present chairman is L. D. Gibbs, of the Edison Company of Boston.

At the convention in Chicago two years ago a petition was circulated among the Philadelphia delegates, and secured the necessary signatures, requesting permission to organize the Philadelphia Section of the Electric Vehicle Association.

The requisite authority having been granted there met, in December of that year, 1913, a small group of the signers, and after a discussion of ways and means, the Section was launched, and the following officers selected:

R. Louis Lloyd, chairman.
A. W. Young, vice-chairman.
J. C. Bartlett, secretary-treasurer.

The formal inauguration of the Section was accomplished by the holding of a large and well attended meeting in the Franklin Institute on January 14, 1914. President Frank W. Smith was present and made an address. Other prominent members of the Association from out of town were also on hand. Invitations to the meeting had been sent to every known owner or operator of an electric vehicle in Philadelphia and vicinity. An illustrated paper by Emlen S. Hare occupied the latter part of the meeting. The membership at this time was approximately 25.

Following this inauguration meeting committees were appointed to work on the following subjects: Membership, Papers and Publicity, Traffic and Garage. These committees immediately got actively at work and made excellent records during their terms of office. Meetings were held monthly, with a stated subject, and speakers for each. Subjects of general interest were preferably selected, and invitations extended, as before, to all electric-vehicle users.

The objects kept in mind, as essentially the work of the Association, were to improve service at public garages, to better acquaint car users with the details of car construction and care, educate chauffeurs and build up the membership and interest in electric cars generally.

Considerable constructive work has been done. The membership has been trebled. The number of garages increased considerably. The standard of service has been raised. A list of both local and foreign garages has been compiled and circulated.

The present officers of the Section are the same as above, they having been re-elected for the year 1915.

Washington Section.

The Washington Section of the Electric Vehicle Association of America was organized at a meeting held on March 12, 1914, which was attended by President Smith and 19 Washington members of the organization. Exclusive of this organization meeting the Section held three technical meetings during the spring of 1914, and during May a Sociability Run was held, in which there were 53 cars entered, and 52 actually started. This run, ending with a picnic at Rock Creek Park, was a great success. A lunch club was organized for the members of the local Section. During the first year it was natural that the work of the local Section was largely that of perfecting its organization.

Since October 1, 1914, the Section has held seven technical meetings, with an average attendance of 29 members and guests; two luncheon meetings, with an average attendance of 10 members and guests. Beginning November, 1914, it was considered desirable to replace the lunch meetings with an informal party. Since that time there have been held six parties, with an average attendance of 30 members and guests, and three entirely unofficial baseball games during the summer, when the Section's activities were discontinued. The Washington Section has been exceptionally successful in securing speakers to address the technical meetings. The policy was adopted of having one talk on a subject of particular interest to the members of the Association, followed by an address, illustrated if possible, on some subject of more general interest. For these

Harvey Robinson,
Chairman, New York Section.

latter talks there were secured a number of experts from the different departments of the government, such as the office of Public Roads. A great deal of interest has been manifested, both in the business meetings and in the social gatherings. They have thus been able to secure a more intimate acquaintance between the various men interested in the electric vehicle and other allied industries. They have been quite successful in arousing interest among the users, as well as among those interested in their sale, having several truck users who regularly attend the meetings.

In May they held the second annual Sociability Run, which was a marked success, having 50 cars entered.

Through the work of the Publicity Committee, and the co-operation of the local newspapers, they have published a number of electric vehicle sections in the daily papers, in each instance two pages being devoted to electric vehicle matters, about half of the space being advertising and the balance news items. The Section has also published several half-page co-operative advertisements in connection with the Sociability Run.

During the period prior to October 1, 1914, E. S. Marlow, Potomac Electric Power Company, was chairman; R. B. Emerson, Emerson & Orme, agents for the Detroit, vice-chairman, and C. M. Marsh, Potomac Electric Power Company, secretary-treasurer. For the year beginning October 1, 1915, R. B. Emerson has been elected chairman.

New York Section.

Going into existence when our petition was accepted by the Board of Directors at a meeting on July 15, 1914, the New York Section has little more than completed its first year of life.

At the first regular meeting of the Section, which occurred on September 30, 1914, the roll call totaled 210 members. During the year 45 new members have joined our ranks, but it was necessary, however, to accept 19 resignations during the year, cutting down our increase to a net of 26 members, and showing a total of 236 members at the present time.

At the first Executive Committee meeting the following committees were

J. W. Schrantz,
Chairman, Cincinnati Section.

formed: Membership, Papers, Publicity, Reception, Nominating, Garage, Performance and Operating Records, Traffic, Insurance, Legislation, Statistics and Employment Registration. These committees have properly organized themselves for the purposes for which they were created, and have been ready at all times to investigate and make recommendations in any of the problems brought to them for solution. The thanks of the Section membership is due in large measure to the Papers Committee, which has labored painstakingly during the year to provide papers dealing with subjects of the moment, and at the same time maintaining the policy that whatever was to be presented and discussed must be absolutely in accord with the aims and purposes of the Association; the data presented must be accurate and useful to the membership and with a note of cheerfulness and optimism revealing itself throughout. A proper start was made at the first meeting, when a paper entitled "Practical Ideals in Electric Vehicle Promotion" was enthusiastically received and discussed. The

H. W. Harrison,
Chairman, Los Angeles Section.

Section has endeavored to use the "Practical Ideal" method throughout its activities during the year. Harvey Robinson, past secretary of the Association, is chairman of the Section.

Cincinnati Section.

The Cincinnati Section was organized at a meeting held on April 22, 1914, at the office of the Union Gas & Electric Company whose president, Mr. Freeman, acted as prime mover. The officers elected seemed unable to get any action out of the members due probably to more or less friction among the local dealers. This condition existed until April 2, 1915, when the Section was reorganized and another effort was made to interest the members by holding a meeting at the Gibson Hotel on May 21, at which time A. J. Marshall delivered an address that proved very interesting to all present in that it enlightened them as to the possibilities in the electric-vehicle indutry.

As the summer season was at hand, no further action was taken until August 30 when the Executive Committee met and laid plans to work up a schedule of activity along several lines. It was proposed to make the September meeting of the Electric Club of Cincinnati an electric-vehicle affair, but owing to the desirability of hearing from the Society of Electric Development, this plan was waived and it is now proposed that the original idea be carried out at the October meeting, which should arouse considerable interest in the Association and enable the Section to increase its membership.

It was decided that no part be taken in the Automobile Show to be held during the week of October 4-9, but to let the Electrical Exposition to be held in Music Hall during Electrical Prosperity Week, be the official Electric Vehicle Show.

It is proposed to take an active part in this Exposition and if possible to hold a Sociability Run as well as an electric-vehicle parade, all of which will go a long way towards stimulating the same interest manifested in so many other cities.

A co-operative newspaper advertising campaign is also contemplated, which can be augmented by the various manufacturers increasing their representation in this city. At the present time there are only three agents handling passenger cars and one handling trucks so that if the other manufacturers will endeavor to secure progressive agents, the burden of educating the public to the use of electric vehicles, will be distributed on a more productive scale.

Efforts will be made to hold monthly meetings for the purpose of disseminating information to the members that will enable them to better combat

J. H. Pieper,
Organizer of Los Angeles Section.

the warfare of the gas cars and place the electric in its proper sphere.

Los Angeles Section.

Prior to January, 1914, there were but two members of the Electric Vehicle Association of America in Los Angeles, both belonging to the Southern California Edison Company and being John B. Miller, its president, as official representative and J. Harry Pieper as an associate member.

Accepting an appointment on the membership committee made by Joseph H. Becker, then chairman of the membership committee, Mr. Pieper commenced gathering in a few associate members, securing these gradually until he finally petitioned for a section with 25 signers to the petition. These included the two other central stations

operating in Los Angeles, with active and associate membership, as well as most of the agents representing the leading electric vehicle manufacturers.

The petition was granted and the section immediately commenced holding regular monthly meetings. Mr. Pieper was elected chairman and served until June, 1915, at which time he was forced to resign on account of pressure of business.

The Los Angeles Section now has a total of 62 members. Regular meetings will be resumed in October and the Los Angeles Section of the Electric Vehicle Association of America is planning to participate actively in Electrical Prosperity Week. The local committees of the Section, particularly the Garage Committee, have accomplished some good work, the Garage

E. M. Jackson,
Chairman, Denver Section.

Committee bringing about a harmonious condition among garage owners and operators that had been conspicuous by its absence. A standard rate for charging, etc., has been adopted and the electric garage business has been standardized, which means successful operation.

We endeavor at all times to have a couple of papers prepared that pertain to some end of the electric-vehicle industry, also we try to get some one who has charge of a fleet of electric trucks, such as the heads of the delivery department in the department stores or any other user of electric trucks to give a talk on what conditions they are running trucks under and the relative savings they make over other forms of delivery, also if they have any suggestions how the application of the electric to their line of business could be improved upon. The same applies to the pleasure car with the individual user. Harry W. Harrison is chairman of the Section.

Denver Section.

The Denver Section of the Electric Vehicle Association of America, petitioned the parent body for the purpose of organizing the Denver Branch. Accordingly, in September, 1914, the first meeting was held, the attendance being fifteen paid up members, these members all engaged in actual electric vehicle work.

At this meeting E. M. Jackson was elected chairman; J. R. Strugnell (the father of the electric vehicle in Denver), vice-chairman, and H. A. Tewksbury, secretary.

Five committees were appointed, viz.: Papers and Program, Membership, Reception and Dinner, Garage, and Dealers.

The first efforts exerted by the branch were in behalf of the local situation as to the improvement of Denver conditions from the standpoint of the garage, the dealer and the car owner.

One of the special accomplishments of this Section was the holding of an electric-vehicle show on the main sales floor of the Denver Gas & Electric Light Company, at which show seven passenger and two commercial trucks were sold. The results of this show decided that the event would be an annual one.

Another great benefit derived by the local members has been the interchange of ideas as to successful and efficient garaging methods adopted through the investigation and research of newer ideas developed in the large Eastern cities.

One of the very interesting items on the program has been "Topic Events." This subject has been handled by a member who extracts from all the various trade journals items of interest concerning the electric car as to its performance, up-keep and development.

Another accomplishment of the local Section has been that by exhaustive effort the garages have been able to increase the rates charged to car owners, who have in turn received greater service as a result.

Prior to the organization of the Denver Section, various electric car and truck dealers experienced very keen competition among themselves, which had resulted in bitter feelings among several of the dealers. The local Branch has eliminated all of this and brought about a very fraternal feeling among all concerned in the electric vehicle industry.

St. Louis Section.

The question of establishing a St. Louis Section of the Association was first seriously considered in April, 1914. The National Association took the matter up to secure at least the minimum of 15 members so that a local Section could be authorized by them, and these were readily secured among the local electric-vehicle fraternity.

A. E. Archer, as chairman of the Advertising Committee has prepared plans for a large co-operative advertising campaign which will be participated in by the local car dealers, central stations, battery companies and accessory houses.

At the present time the newspapers are carrying a great many columns of gasoline-car publicity but it is very seldom that anything is carried pertaining to the electric vehicle and we believe this condition should be remedied.

F. E. Stevens, as chairman of the Garage Committee has made an exhaustive study of garage conditions as they exist in St. Louis at the present time and he has made a number of recommendations to our Section with the thought of having garage practice standardized. The recommendations of his Committee have been adopted by practically all of the garages operating in St. Louis.

C. E. Michel was recently appointed to prepare a map of the City which would clearly indicate at just what points charging current would be available. As soon as this map has been completed it

Will Spaulding,
Chairman, Portland (Ore.) Section.

will be furnished to all owners of electric cars in St. Louis.

It has been our endeavor at recent meetings to have a paper presented by a representative of apparatus used in the electric vehicle industry.

Portland Section.

On June 21 an organization meeting of the Portland Section was held and officers elected to serve until the beginning of the association year in October. The officers elected were Will Spalding, Walker and Milburn agent, chairman, A. N. Stanton Meier & Frank, vice-chairman and G. H. Beazan Northwestern Electric Company, secretary.

The plans for the coming year involve a monthly luncheon taking about two hours at which the regular business and a short program will be given.

We also plan to establish an electric vehicle page in one of the local papers every second Sunday throughout the winter about one-half of the page to carry ads from the different dealers and accessory manufacturers and the balance to be reading matter as much of a local nature as is possible.

The Opportunity for the Sale of Electrics.

Specific Advantages for Various Industries.

This article comments first on some of the general advantages of the electric commercial vehicle, pointing out its value in general delivery service. The specific advantages of electrics for delivery service in a few of the more common industries are then considered. Testimonials from satisfied users supplement this. Data sheets showing the actual operating costs of a number of individual vehicles in ordinary service accompany the text.

There can be no question about the serious consideration that the business man of today is giving to his haulage problems. With the advent of the efficiency idea and consequent inquiries into the cost of doing business not as a whole but as so many distinct unit operations, the searchlight of investigation was early turned on existing transportation systems. It was at first difficult to convince operators of delivery systems that the horse haulage was inefficient, largely because of inexact accounting which made it impossible to determine exactly what haulage and trucking costs were and also, perhaps, because of the feeling of sentiment which had attached itself to the horse as a servitor of man. Such sentiment no longer exists and today delivery problems are being solved solely on a basis of efficiency and economy with the result that a large proportion of the traffic, at least in all important cities, is rapidly becoming motorized.

The question of gasoline versus electric delivery naturally occurs to prospective users although in actual practice there is really very limited competition as each type of vehicle has its logical field.

In making comparisons, however, the purchaser is prone to consider the electric as a new development and it may therefore be of interest before dealing with the specific advantages of electric vehicles in the various industries, to refer briefly to the early history of this mode of transportation as so interestingly recounted in a booklet published by the Electric Vehicle Association of America.

Commercial vehicles propelled by electric current came into practical existence in 1897. The early models, of course, possessed their disadvantages, and it was natural to expect, as the machine went from one stage of development to another, that considerable improvement would result. It is consequently, important to note that within a very short time a state of stability was obtained which has not since been radically changed, although every advantage has been taken of the natural improvements in battery, tires and other equipment.

The reasons for early public unbelief in the advantages of the electric commercial vehicle may be summed up briefly as being misinformation as to the life and performance of the vehicle which could not be overcome by the data available, lack of charging facilities, cost of current, the application of the vehicle to improper fields of endeavor and finally the lack of knowledge as to the real merits and special excellence of the electric vehicle.

The first electric vehicles produced show a reliability after years of operation that is decidedly surprising. In fact, it may be said that the endurance of these vehicles, well maintained and systematically cared for, is not yet known. It is improbable that the designers of the electric commercial vehicles built from 1898 to 1905 realized the excellence of their machines. Several of the service wagons operated by the New York Edison Company have been in use for ten years; one has been used by Frederick Loeser & Company, of Brooklyn, for eleven years; one has been used by Stern Brothers, of New York City, for nine years; three of the fleet of Tiffany & Company were delivered to that firm early in 1901; three of the machines owned by Arnold Constable & Company, of New York City, were delivered in 1903, and one of the delivery wagons built for B. Altman & Company in 1898 is regularly used. There are several 1899 models still running—the original truck of the Central Brewing Company is making regular trips through the streets of New York City. The F. A. Poth & Sons Brewery, in Philadelphia, is using daily an electric truck delivered eleven years ago, and, so far as indications go, it is just as reliable and does quite as good work as it ever did. Many other examples of long service may be given.

It is to be remembered that in the development of the electric commercial vehicle there have been two distinct paths of endeavor—the storage battery and the construction of the vehicle itself. These have been pursued by different engineers, each more or less dependent on the other; that is, vehicle designers have desired batteries of comparatively light weight and large capacity to minimize the load of the machine and to obtain the power necessary to increase the radius of operation. Battery development has been independent of the vehicle manufacturer except for the benefits of experience that he has contributed. The manufacturers of batteries developed their products decidedly and quickly. Weight has been decreased, capacity increased and durability secured. In every respect, improvement has been made and the cost lessened.

During the period from 1900 to 1910, the electric commercial vehicle went through a decidedly satisfactory period of experimentation and test. The number in use increased annually—repurchases were made by concerns of large haulage requirements—more and more manufacturers entered the field and placed machines on the market. But it is within the last two years that the greatest growth has been made. In New York, between July 1, 1911, and July 1, 1912, the number of electric commercial vehicles in use grew 45 per cent, while an authority in Chicago estimates that the increase in that city during the last two years was 400 per cent. In Boston the increase in the same period of time has been 134 per cent.

Coincident with this formidable percentage of increase in the number of electric commercial vehicles has been a steady decline in the cost of the vehicle itself and the current necessary for its propulsion. In spite of the fact that fuel for other types of motor vehicles is constantly increasing in cost, the price of electric current for battery charging has decreased during the last 10 years from an average of 23 cents per kilowatt-hour to about five cents.

In considering electric vehicles for any character of delivery service there are numerous general advantages that immediately suggest themselves and that should be given thorough consideration by the prospective user. The most important of these advantages are summarized in the following paragraphs.

Electric vehicles consume no power when not in operation; they can be started instantaneously. The perfect ease of control allows any intelligent horse-driver to run an electric, and there is, consequently, no need to school a chauffeur into learning new routes. Then, too, the perfect simplicity of mechanical parts means few repairs and little attention.

As each electric vehicle is rated to

carry a certain load and to travel at a certain maximum speed, with provision for lower speeds, the driver cannot run the machine beyond the maximum speed. Due to this automatic control, tires are saved and unnecessary wear on the mechanism is eliminated.

There is no risk of fire or explosion, as an electric can be kept anywhere without affecting insurance. It is possible to run them on wharves, where other types of motor cars often are barred.

An electric can be stabled where horses are not permitted and with an economy of space. In large cities, where real estate values are apt to soar, the installation of electric trucks frequently means that stable space can be turned over profitably to other uses.

Electric commercial vehicles can go from 35 to 50 miles a day, with still greater radius where required, and are ready for the same amount of work the next day. A daily average of 15 miles is excellent for a horse, and a working horse must rest one day in five.

Besides enabling the user to widen his area of delivery the distinctively up-to-date appearance of electric vehicles has splendid advertising value. The merchant who wishes his delivery service to advertise his business can count upon these clean, noiseless, dignified and efficient delivery wagons to suggest to the public that he is the sort of merchant with whom they should trade.

Business men have come to realize that their delivery service is really their business on wheels and that the public judges them and their methods by the appearance of their delivery service. As a result, the tendency is for the merchant to make his delivery service a true reflection of the quality of his merchandise and of his store service. Electric delivery service unconsciously makes a strong impression on the public eye and instills conviction of the stability and up-to-dateness of the concerns that use it.

The advertising value of electric delivery service means more perhaps to retail establishments using vehicles of lighter tonnage than to the firms requiring heavier trucks. Here the money saved becomes the basic consideration rather than the impression made. The economy effected by the use of the electric truck in one year approximately equals the money paid for it; that is to say, that a five-ton electric truck will do the work of three horse-drawn teams, saving $12 per day on an average. Proportionate savings may be effected with all sizes of electric commercial vehicles.

There are almost innumerable other advantages that might be stated, but the prospective purchaser is finally most interested in what the specific advantages are of the commercial electric vehicle in his particular line of business and what the experiences of other users have been in this connection.

In the following paragraphs an attempt has been made to classify the usual trades employing some sort of delivery with an outline of the reasons why electric vehicles should be given consideration in each case. Supplementary testimonials selected at random from a large number of communications, indicate the success of electrics in the industries considered.

Bakeries-Confectioners.

One of the most important requisites of a satisfactory delivery system for bakeries and confectioners is cleanliness. The large establishments all appreciate this, and more and more attention is being given this item by the smaller bakeries. The exacting demands of the public that has made necessary the installation of machinery to do the work formerly performed by hand, will also extend to the delivery system and will mean the passing of the horse. There is no type of vehicle that insofar as cleanliness is concerned can compare with the electric. There is no possibility of contaminating the goods from gasoline fumes. The cleanliness of the electric is further emphasized by the practice of numerous bakeries providing their drivers with white uniforms.

Of equal importance with cleanliness is promptness and reliability, and these requirements make bakeries one of the best fields for the sale of electric vehicles. The corner grocer, baker, and delicatessen man must have regular and dependable deliveries. Their goods must come to them fresh and clean, as soon after baking as possible. And the deliveries must be made at regular intervals and on schedule time, regardless of weather conditions.

Deliveries of this character usually

GENERAL.

Name of Company—Albers Bros. Milling Co., Portland, Ore.
Business—Cereal Millers and Dealers in Grain, Hay, Flour and Feed.
Capacity of Vehicle—1.5 Tons.
Approximate Price—$3,382.50.
Make of Tire—Goodrich Special.
Tires—Solid.
Make of Battery—Edison.
Number of Cells—Sixty.
Date of Purchase—October 26, 1912.
Make of Vehicle—Detroit Electric.
Size of Tires—Front 34x4, Rear 36x5.
Type of Cells—A-6.

OPERATING DATA.

Average Daily Mileage—27.3.
Kilowatt-hours per Month—666.
Daily Hours in Use—10.
Days in Service, per Month—25.7.
Cost of Electric Power per Month—$19.98
Driver's Salary per Month—$77.00.
Cost of Repairs and Renewals for Six Months—$51.86 (Not an average).

TOTAL AVERAGE MONTHLY OPERATING COST—$105.46 (6 months' average).

GENERAL

Name of Company—Eagle Furniture Company, Memphis, Tenn.
Business—Furniture (retail).
Capacity of Vehicle—2,000 lbs.
Date of Purchase—Feb., 1912.
Approximate Price—$2,800.
Make of Vehicle—Detroit.
Make of Tires—U. S.
Size of Tires—3½x33 inches.
Tires—Solid.
Make of Battery—Edison.
Type of Cells—6-A.

OPERATING DATA.

Average Daily Mileage—30-40.
Daily Hours in Use—10.
Days in Service, per Month—26.
Cost of Electric Power, per Month—$35 (average).
Cost of Storage and Washing, per Month—$20.
Driver's Salary, per Month—$40.
Cost of Repairs and Renewals for 23 Months—Battery, $35; Other, $250.

Total Average Monthly Operating Cost—$110.

entail short hauls and frequent stops, and the superiority of the electric for such service cannot be questioned. The large bakeries of the country, such as Ward Baking Company of New York and Chicago, Schulze Baking Company of Chicago, and others depend almost entirely on electric vehicles for retail deliveries.

What the electric vehicle has done in the way of economy and efficiency for the large establishments can also be done for the small neighborhood bakery now employing one or more horse-drawn wagons. Cleanliness, promptness and reliability of delivery are just as essential to the small firm as the large, and when these features can be secured with a saving in cost, or even at the same cost, there is no reason why the antiquated horse delivery should be further countenanced.

Regarding the service which electrics are giving to bakeries, the vice-president of the Ward Baking Company, New York City, writes as follows:

We employ for bread deliveries to the retail trade in the New York field in daily use 355 electric vehicles. We find them to be economical in working. The car is stationed in the bakery exactly at the spot where it receives its load of goods each morning. When the car comes in each evening it is washed, examined for defects and if passed for service next day it goes to its place, and while there its batteries are charged in order that it may be ready for service early the following morning.

We find the mileage obtainable is quite sufficient for all city needs, and that for calling upon the trade, that is the grocer and delicatessen trade—which are within easy reach of each other, many times three and four to a city block—there is no starting or stopping of an engine, as would be the occasion with a gas car, with the result of power being wasted while the car is standing idle. There is no excessive speed in its operation, and yet it is sufficient for city travels.

The Case & Martin Company, of Chicago, wholesale pie bakers, write as follows:

The electric car meets the requirements of our service to very much better advantage than a gas car or horse vehicle.

In view of the success we have had with electrical trucks, would say we are running about 25 electric cars at the present time and putting on more as fast as we can get to it. We find they are very satisfactory for our deliveries and cannot say too much for them as we feel the electric truck is the only truck for delivering as any intelligent driver can operate them without any difficulty whatsoever and are very efficient in maintaining and up-keep.

General.

Name of Company—Geo. S. Connelly Company, Springfield, Ill.
Business—Retail Grocers, Butchers, and Bakers.
Capacity of Vehicle—1,000 Lbs.
Date of Purchase—Sept. 5, 1913.
Approximate Price—$2,500
Make of Vehicle—Argo.
Make of Tires—Motz.
Size of Tires—36x3.
Are Tires Solid, Pneumatic or Cushion?—Solid.
Make of Battery—Edison.
Type of Cells—A-4.
Number of Cells—60.

Operating Data.

Average Daily Mileage—27.
Daily Hours in Use—8.
Kilowatt-hours per Month—338.
Days in Service, per Month—28.
Cost of Electric Power per Month $7.50.
Cost of Storage and Washing per Month—Car washed by driver. Stored in rear of store.
Driver's Salary per Month—$40.
Cost of Repairs and Renewals for 12 months—$50.00

Total Average Monthly Opfrating Cost—$90.40.

General.

Name of Company—General Electric Company, Philadelphia.
Business—Electrical Machinery and Supplies.
Capacity of Vehicle—2,000 Lbs.
Approximate Price—$2,500.
Make of Tires—Goodrich.
Tires—Solid (demountable rim).
Make of Battery—Philadelphia
Date of Purchase—May, 1910.
Make of Vehicle—General Vehicle Company.
Size of Tires—34x3½ Inches.
Type of Cells—Lead Plate (thin).
Number of Cells—44.

Operating Data.

Average Daily Mileage—35.
Daily Hours in Use—10.
Kilowatt-hours per Month—500.
Cost of Electric Power per Month—$15.
Cost of Storage and Washing per Month—$10 (washing only).
Days in Service, per Month—25.
Driver's Salary per Month—$65.
Cost of Repairs and Renewals for Twelve Months—Battery, $300; Tires, $150; Motor, $25; Other, $100 (includes inspection).

Total Average Monthly Operating Cost—$165 (includes interest on investment and depreciation and insurance charges).

Brewers and Bottlers.

It is a pretty widely known fact that the brewing industry has made a large expenditure for electric commercial vehicles and the success with which these interests have been operating this type of machine can be taken as an indication of what may be expected from motor vehicles in other lines of business. One of the strongest boosts the electric ever received came, unsolicited, from Jean A. Blaise, superintendent of the transportation department of the Doelger Brewing Company, of New York City, at the recent convention of the Electric Vehicle Association of America. Among other things Mr. Blaise stated that 58 electric trucks were saving $80,000 a year for his company. Two men, one at $23 and one at $14 per week, are required to look after the electrics. This company has disposed of its entire stable of 200 horses, and in so doing twenty-eight city lots, valued at $20,000 each, or a total of $560,000, have been released, as the horse stable, which was 350 by 350, has been replaced with an electric garage, 85 by 100 feet, and the ground formerly occupied by the horse stable will be utilized for buildings in which beer will be bottled. The delivery of beer formerly cost this firm 35 cents per barrel, but with the electrics this has been reduced so that within the eight-mile radius the cost of delivering amounts to 15 cents per barrel. It is expected that as soon as additional trucks are installed—eight of which have been ordered—there will be a further reduction made. It is also presumed that beer will be delivered with the aid of more trucks at a cost of 12.5 cents per barrel, and this company expects to pay for its complete change to electrics in three years with the saving effected. After that time it can be seen that the saving will become more in the form of an earning.

Another instance of where real economy has been effected by the use of electric trucks by the brewing trade is found in the experience of the Jacob Ruppert Company, also of New York, which has 83, purchased at intervals covering about seven years. A saving of $833.33 per machine per year is now being realized by this company. Out of 120 powerful horses, valued at $1,500 and $2,000 per team, only 50 remain in service, and in the meantime business has increased constantly. The cost of delivering beer, when the company was using 120 horses was 33.7 cents per barrel. With electrics it has been 24.75 cents per barrel, a reduction of approximately nine cents on each one. Although the horse equipment hauled about the same load as the electric—11,000 pounds—the distance traveled by each kind of equipment shows a wide variation. Horses accomplish only 12

miles a day, as against a rated battery mileage of 35 for a five-ton machine and a speed of seven miles an hour, practically twice as fast as the horses were able to go.

As in the case of the Doelger company, the Ruppert interests have trained their horse drivers to operate the electrics, but this is not a new departure from the general practice, as statistics reveal the fact that ex-teamsters are now driving electric machines for various firms in all sections of the country.

These are just two of the many examples that could be cited to show the advantages of electric trucks for brewery delivery. The fact that the electric is being extensively used by brewers in many of the larger cities of the country, and is at least being introduced in most of the smaller cities, is known to most people who are at all interested in transportation. It is said that within a very few years fully two-thirds of all city trucking will be taken care of by the electric.

The following expressions from users in this industry are selected from a large number of communications, all of which highly endorse the electric for such service.

The Peter Schoenhofen Brewing Company, of Chicago, writes:

In response to your inquiry of the 18th instant, regarding our views and experiences as to the adaptability, economy and performance of the electric truck in our particular service, permit us to state, that we have twelve trucks which have been in continuous service since their installation in April and May, 1914, and so far they have not lost a day during this period.

In a delivery service such as ours, calling for heavy loads and frequent stops, we have found this type of truck especially suited and have been clearly convinced of its economy, since we have arranged our horse routes so as to give the machine a load in keeping with its rated capacity and sufficient territory to get a fair day's work out of each truck.

We can frankly state that we have found the electric cheaper to operate than any other type provided the required mileage does not exceed the limitations of the battery.

The C. Schmidt & Sons Brewing Company, of Philadelphia, writes:

We have been using electric motor vehicles since 1903, and have added to our equipment from time to time, the number in use being now twenty-eight, in capacities from one to five tons. Our horse-drawn vehicles have been almost entirely replaced.

We find the service more satisfactory and economical, and our experience is proven by the increase in the use of the electrical truck, as above.

A brewer in La Crosse, Wis., says:

Our two-ton electric truck was put into service eight years ago, and for the first five years we kept no record. We find upon investigation that our record on this machine, from March 1, 1910, to October 2, 1912, shows an upkeep expense of $631.40. These figures cover tires, batteries and replacements, as well as labor incident to making these repairs. During this period the truck has covered a distance of 11,840 miles. A 3.5-ton truck, purchased in March, has covered a mileage of 2,360 at an expense of $45. The above figures do not include current. In our experience the electric truck has proved more satisfactory and economical than a gasoline truck for city deliveries.

Coal and Fuel.

Somewhat the same conditions apply in the delivery of coal and fuel, as in the brewery business. Heavy loads are the rule, and reliability is an essential. The peak of the coal delivery business usually occurs during the severe winter weather, when the traffic conditions are usually poorest. Under such conditions there can, of course, be no question as to the utter unreliability of the horse-drawn vehicles. Horses are not only affected by severe cold, but the slippery pavements also make it decidedly dangerous and expensive, as is indicated by the large number of horses killed each winter.

For the large coal-distributing companies handling five and 10-ton shipments to outlying yards and to wholesale consumers, the gasoline truck is usually preferred, because of its greater mileage radius, but the retail delivery logically comes within the field of the electric truck.

Frequent stops of long duration in cold weather do not affect the electric, whereas the gasoline engine is notoriously difficult to start and costly delays are frequently encountered.

Department Stores.

The phenomenal increase in the use of electric vehicles by department stores is sufficient indication of the utility of this type of vehicle for a service where numerous stops have to be made. In Chicago the large department stores all pride themselves on their prompt, efficient delivery systems and practically all of them depend upon the electric vehicle for the major share of the delivery work.

Marshall Field & Company lead in the number used, the present fleet of this company aggregating over 215, representing an investment well over $1,000,000. Carson, Pirie, Scott & Company, another prominent department store, operates a fleet of 65 electrics, while The Fair and Mandel Brothers each have in use about 35 vehicles of the electric type.

The fact that these stores, which necessarily make a scientific study of transportation problems, decided upon electric vehicles and subsequently are

GENERAL.

Name of Company—Roessler & Hosslacher Chemical Company.

Business — Manufacturing Chemists.
Capacity of Vehicle—One ton.
Approximate Price—$3,575.
Make of Vehicle—Commercial Truck Company of America.
Make of Tires—Firestone (solid).
Date of Purchase—June 2, 1913.
Battery—Edison.
Size of Tires—36x3½.
Cells—60 A-6.

OPERATING DATA.

Average Daily Mileage—20.
Kilowatt-Hours per Month—1,200.
Cost of Electric Power, per Month—$30.
Driver's Salary ,per Month—$58.
Daily Hours in Use—10.
Days in Service, per Month—26.
Cost of Repairs and Renewals, Average $30 per Month.

TOTAL AVERAGE MONTHLY OPERATING COST—$120.

GENERAL.

Name of Company—Commonwealth Edison Company, Chicago.

Business—Central Station.
Capacity of Vehicle—3,000 pounds.
Approximate Price—$2,500.
Make of Vehicle—Walker.
Make of Tires—United States (solid).
Battery—Exide.
Size of Tires—42x3½ and 38x3.
Cells—40 11 MV.

OPERATING DATA.

Average Daily Mileage—25.
Kilowatt-Hours Per Month—400.
Cost of Electric Power, Per Month—$8.00.
Cost of Storage and Washing, Per Month—$22.
Driver's Salary, Per Month—$65.
Daily Hours in Use—8.
Days in Service, Per Month—26.
Cost of Repairs and Renewals for 12 Months—Battery, $192; Tires, $60; Other, $60.

TOTAL AVERAGE MONTHLY OPERATING COST—$121.

adding to their fleets as rapidly as possible, is an indication of the success of the electric for department-store service.

Chicago is not the only city where department stores have found the electric most suited to the specific conditions involved. The large establishments of New York, Washington, Philadelphia, Boston, and in cities throughout the West, are all enthusiastic users. In fact, statistics recently compiled indicate that in the value of investments in electric commercial vehicles department stores lead the field, with an aggregate investment of about $6,000,000. Breweries are second, with an investment totaling over $5,500,000, and public utilities are third.

General.

Name of Company—Palmer Bee Company, Detroit, Mich.
Business—Factory Supplies.
Capacity of Vehicle—2 tons.
Approximate Price—$3,750.
Make of Tires—Goodrich (Solid).
Make of Battery—Edison.
Date of Purchase—January 28, 1913.
Make of Vehicle—Detroit.
Size of Tires—3½ inch front; 4 inch double rear

Operating Data.

Average Daily Mileage—40.
Daily Hours in Use—9.
Kilowatt-Hours per Month—
Days in Service, per Month—25
Driver's Salary, per month—$70.
Cost of Repairs and Renewals for 12 Months—None.
Cost of Storage and Washing; Cost of Electric Power—$55.

Total Average Monthly Operating Cost—$125, not including depreciation or interest charges.

General.

Name of Company—F. A. Poth & Sons, Incp., Philadelphia, Pa.
Business—Brewers.
Capacity of Vehicle—5 tons.
Approximate Price—$4,400.
Make of Tires—Gibney Wireless (Solid).
Battery—Ironclad—48 cells.
Date of Purchase—1911.
Maker of Vehicle—General Vehicle Company.
Size of Tires—36x5 front; 36x 3½ dual rear.

Operating Data.

Average Daily Mileage—20.
Daily Hours in Use—8.
Kilowatt-hours per Month.
Days in Service, per Month—25.
Driver's Salary per Month—$76.00.
Cost of Repairs and Renewals for 12 Months, $650.
Battery, $450.
Tires, $200

Total Average Monthly Operating Cost—$151.

The item of $21 per month includes all service charges and entire care of vehicle which is kept in company's garage Charging current is supplied from the company's power plant

Express and Haulage.

Under this classification comes, in addition to the usual run of express and transfer companies, the haulage contractor, who either rents vehicles by the hour, day or week, or undertakes a specified delivery service at contract or parcel rates. The latter field has only been slightly touched, and there is considerable opportunity for the extension of this class of business in every progressive locality. In many instances it has been found profitable to combine such a professional delivery service with a public commercial-vehicle garage.

The established express and transfer companies are rapidly motorizing their delivery systems, and electric vehicles are coming in for their share of attention. Where local distributing depots are maintained in various sections of a city the electric wagon is the ideal vehicle for such service, being much more economical and satisfactory than the gasoline type. The latter are usually employed to carry bulk shipments and to handle the parcels from the freight stations and warehouses to the distributing depots.

The leading express companies of the country, such as the United States Express Company, Adams Express Company, American Express Company, etc., all operate large fleets of electrics, and the horse-drawn vehicle is being replaced as rapidly as possible.

The opinions of a few companies regarding the serviceability of the electric are presented in the following communications:

The American Express Company writes:

Our companies find the electric motor truck, in its special service excellently adapted for the work, and, through constant supervision and care, economical in operating, furnishing a superior performance to horse-drawn vehicles wherever we have substituted it for the latter.

The Lincoln Safe Deposit Company, of New York City, writes as follows:

I will state that our reason for taking up motor vehicles eight years ago was that we realized that our patrons were yearly moving further uptown and away from us and if we were to hold the trade it would be necessary for us to compete with the prices of uptown movers; that horse-drawn vehicles were ratehr slow for this. It would have been necessary for us to increase the number of our horse-drawn vehicles or to substitute motor wagons.

Carrying very valuable property, much of which, in the event of fire, could not possibly be replaced, and being fearful of gasoline, we dismissed gas cars from our minds at once. We thoroughly investigated the electric vehicle, found that by making our own current we could very readily charge the vehicles at night at small expense; no separate garage would be required, and our insurance rate would not be affected by storing them on the ground floor of our warehouse; our engineer could readily look after the mechanical part of the vehicles and our horse drivers were quickly instructed as to the handling of the electric vehicles.

We have gradually replaced our horse-drawn vehicles, doing away with them entirely last year. Our oldest electric wagon of one-ton capacity has now been in operation for eight years and is running in as satisfactory a manner as it did when we first bought it. We now have two one-ton delivery wagons that in the busy season operate from thirty-five to forty miles per day each, delivering packages, and we have six 3.5-ton vans of about 500 cubic feet capacity which we use for hauling furniture and household goods to and from our warehouses. As a large part of the time in furniture van service is taken up with loading and unloading these are not so economical as are the delivery wagons, but it is a great satisfaction to be able to make two long trips a day with one of these vehicles, where in the past with horses we could only make one such trip. Formerly with horses it would require at least an hour from the time we opened up in the morning before all of our vehicles had left the premises. Now in five minutes after opening up all vehicles in busy time are out of the warehouse.

We believe the electric vehicle is the ideal equipment for city delivery. We do not make long out-of-town hauls. This work we contract out to those having gasoline vehicles, although we occasionally make runs of fifteen or eighteen miles into the country with our electric vans.

Grocers, Butchers and Fish Dealers.

Wholesale grocers and butchers have necessarily made a detail study of unit costs in their business, and it is safe to assume that the delivery department has come in for its share of consideration. Electric vehicles are popular in this service, for practically the same reasons as is true of bakery delivery. Cleanliness is essential, and there must be absolutely no possibility of contamination of food from gasoline fumes.

The small neighborhood grocers, of which there are many thousands, have given apparently little consideration to the delivery problem, and it is undoubtedly true that the business of many such establishments is curtailed by the limitations of the delivery service.

It would seem that this business should be cultivated, through the es-

tablishment of commercial garages where such isolated vehicles could be cared for at a nominal rate. The small grocer operating one or two horse-drawn vehicles seldom realizes what his delivery service costs him.

Hardware.

Both hardware manufacturers and dealers have found the electric truck admirably suited to the needs of the business, as is indicated by the large number of installations in this field. Among the manufacturers dealing in heavy material a point in favor of the electric is the simplicity and economy of a motor-driven winch for loading, which can be economically operated from the vehicle battery. Dealers handling hardware in small packages are equally enthusiastic over the merits of the electric.

A Pittsburgh manufacturer writes as follows:

We still have in daily use the five-ton electric truck bought seven years ago, and it is giving us the same satisfaction it has given us during its entire service. While the truck has had what we consider a long life, it is today in excellent condition and seems good for many years to come.

Another dealer writes: It would seem that there is nothing better we can say than to recall the fact that we purchased our second machine after some six or seven years' service.

Paper and Paper Products.

Paper and its products weigh heavily, and for that reason particularly the electric truck, because of its ruggedness, makes such a splendid showing. It is no uncommon occurrence for a machine in this service to move three times the tonnage of a horse-drawn outfit.

The Robert Gair Company, of Brooklyn, N. Y., make the following comment relative to the service of their electric vehicles:

We have found that the electric truck equipment which we are using—it consists of five different types—is more economical than the gas equipment where short hauls are concerned. This is particularly true in congested districts where we have several stops to make in a limited area. In the case of distance deliveries, where few stops are to be made, we find that our gas equipment is much superior to the electric, in that we cover greater mileage in much less time. Of course, to do this it means that the operation of the gas equipment exceeds the expense of the electrical equipment.

Printing and Publishing.

As in the paper business, the weight of the product handled has had considerable influence in the extensive employment of electric vehicles by printing and publishing plants.

No more convincing testimony of the serviceability and economy of the electric commercial vehicle in this service can be given than the statement of C. Ford, public printer, Government Printing Office, Washington, D. C., as follows:

In reply to your communication I inclose herewith data relative to operating expenses of electrical vehicles of the Government Printing Office.

These costs cover two years; it will be noted that the costs for the second year are higher than those for the first year, due to the renewals of batteries. The third year should about equal the first, so that an average between the two years is a reasonable number.

Generally speaking, these electric vehicles have given excellent service, and save us over $10,000 a year. The work done by them cannot be handled with twice the number of horses.

TABLE I—OPERATING EXPENSES OF ELECTRIC VEHICLES FOR FISCAL YEAR 1913-1914.

Second Year of Service.

Car No.	1791	1794	1792	1793	1790	1795	1824	1826	1825	1859
Date Installed	Dec., 1911	Dec., 1911	Dec., 1911	Dec., 1911	Dec., 1911	Dec., 1911	Nov., 1912	Jan., 1913	Nov., 1912	Jan., 1914
Capacity, lbs.	1000	1000	2000	2000	5000	5000	5000	8000	P. P. 1 Baker	P. P. 2 Rauch & Lang.
Mileage	7252	3422	6654	4425	4705	6598	4952	3423	4627	1723
K.W.-Hours Supplied	3396.7	3825.8	3773.3	3001.8	4465.2	3479.3	3064.2	5148.5	3968.1	323.8
Cost of Current @1½c per K.-W.-Hour	$ 50.95	$ 57.39	$ 56.60	$ 45.03	$ 66.98	$ 52.19	$ 45.96	$ 77.23	$ 59.52	$ 4.86
Battery Upkeep	175.53	162.38	162.56	157.41	152.90	158.76	151.19	160.45	154.60	60.97
Tire Upkeep	77.23	76.22	102.58	126.57	93.86	84.23	104.94	.....	362.23	94.73
Electrical Upkeep	17.26	20.29	16.24	4.29	16.86	125.02	10.09	4.03	14.92	20.10
Mechanical Upkeep	93.54	65.49	113.85	60.12	101.32	134.29	52.97	23.03	66.10	14.89
Inspection, Washing, etc.	202.76	202.76	202.76	202.76	202.76	202.76	202.76	203.41	202.76	79.03
Total Maintenance	$617.27	$584.53	$654.59	$596.18	$634.68	$757.25	$567.91	$468.15	$860.13	$274.58

TABLE II—OPERATING EXPENSES OF ELECTRIC VEHICLES FOR FISCAL YEAR 1914-1915.

Third Year of Service.

Car No.	1791	1794	1792	1793	1790	1795	1824	1826	1825	1859
Date Installed	Dec., 1911	Dec., 1911	Dec., 1911	Dec., 1911	Dec., 1911	Dec., 1911	Nov., 1912	Jan., 1913	Nov., 1912	Jan., 1914
Capacity, lbs.	1000	1000	2000	2000	5000	5000	5000	8000	P. P. 1 Baker	P. P. 2 Rauch & Lang
Mileage	5961	4967	5749	4202	3972	4180	4429	4274	2513	2537
K.W.-Hours Supplied	3053.2	4085.7	3595.4	3179.0	4661.0	3649.2	3029.8	5576.6	2908.1	346.1
Cost of Current @1½c per K.W.-Hour	$ 34.70	$ 41.18	$ 42.14	$ 36.09	$ 54.16	$ 42.03	$ 35.18	$ 63.72	$ 31.40	$ 9.25
Battery Upkeep	522.96	537.42	547.43	545.01	753.23	686.59	211.71	164.33	236.76	590.18
Tire Upkeep	.....	81.81	80.34	98.57	66.20	122.45	4.11	69.38	82.66	.....
Electrical Upkeep	72.60	18.16	33.84	22.52	21.13	28.81	22.93	20.55	26.17	19.50
Mechanical Upkeep	204.28	120.75	171.17	189.07	168.85	65.48	164.17	118.44	314.90	28.53
Inspection, Washing, etc.	166.82	166.82	166.82	166.82	166.82	166.82	166.82	167.52	166.82	166.82
Total Maintenance	$1,001.36	$966.14	$1,041.74	$1,058.08	$1,230.39	$1,112.18	$604.92	$603.94	$858.71	$814.28

The Curtis Publishing Company, of Philadelphia, writes:

In reference to your letter on electric vehicles, we have found them very satisfactory and running at much less expense than the horses and wagons.

When electric vehicles are put in by a company they should be checked up very closely, and the main thing to consider is the unloading and loading time and the distance that is to be traveled in making the delivery and the return.

All of this was considered thoroughly here, and our equipment is a success.

Public Service Companies.

So much has been written concerning the electric-vehicle opportunity that it is doubtful if there are many utilities that do not fully realize the importance of the battery charging load and the part they are justified in taking to secure this desirable business. Certainly the central station in general has a wonderful opportunity to aid in the introduction of the electric truck because of the fact that it is in no small degree a consulting engineer to industry and commerce. It is a recognized public servant, an aid to local growth and prosperity. The central station is the logical advocate of the electric truck, and this is why the truck manufacturer asks its aid in agitating, through local advertising, and other publicity methods, its increased use.

However, regardless of the actual promotive work which the utility finds it desirable to do, all interests concerned in the development of the electric-vehicle industry are agreed that all central-station companies should, at least employ electrics in their own transportation work. The public endorsement thus given the battery vehicle would have a stimulative effect on the general development and the operating records obtained by the company could be used to demonstrate the economy of electric delivery to the prospective users.

In practically all of the large cities and in a surprisingly large number of small communities, central stations are using electrics for their own deliveries and regardless of their motives in originally purchasing vehicles of this type, the resultant economies have made the subsequent purchases a matter of dollars and cents.

In Chicago the Commonwealth Edison Company operates a fleet of 127 electric vehicles of all sizes and of all types. This company has always been a strong advocate of the electric, and has spent considerable time and money in development work, but it is, of course, ridiculous to assume that an installation of 127 electrics was made on any other basis than that of economy. The following expressions from central stations give but a brief summary of the conditions in this field:

General.

Name of Company—J. L. Marcero & Company, Detroit, Mich.
Business—Wholesale Confectionery and Cigars.
Capacity of Vehicle—1,000 pounds.
Approximate Price—$2,500
Make of Tires—Firestone (solid).
Battery—Edison.
Date of Purchase—1911.
Make of Vehicle—Detroit Electric.

Operating Data.

Average Daily Mileage—50.
Daily Hours in Use—10.
Cost of Electric Power, Per Month, $45, Including Storage and Washing.
Days in Service, Per Month—26.
Driver's Salary Per Month—$60.
Cost of Repairs and Renewals for 12 Months—$460

Total Average Monthly Operating Cost—$143.

General.

Name of Company—Emergency Hospital,
City—Washington, D. C.
Business—Emergency Surgical and Medical Work.
Capacity of Vehicle—Four.
Date of Purchase—July 1, 1912.
Approximate Price—$3,500.
Make of Vehicle—Detroit.
Make of Tires—Motz.
Size of Tires—34x3½.
Type of Tires—Cushion.
Make of Battery—Edison.
Type of Cells—A-4.
Number of Cells—60.

Operating Data.

Average Daily Mileage—5.35.
Daily Hours in Use—20.
Days in Service, per Month—Continuous.
Cost of Electric Power per Month—$17.00.
Cost of Storage and Washing per Month—$20.00.
Driver's Salary per Month—$35.00.

Total Average Monthly Operating Cost (including tires, repairs, etc.) $85.00.

The Philadelphia Electric Company writes: Replying to yours, asking for our views on the adaptability, economy and performance of the electric for our particular service, wish to advise we have 45 electrics in service at this time, and we can unhesitatingly say that they are all doing good work and are capable of doing much more if we could arrange our work accordingly.

The point I wish to make is, that our average daily mileage is much less than what the vehicles are capable of making, and do not make the showing that a department store or express company would, where they can keep their vehicles moving all day, except when loading or unloading.

Nearly all of our street gangs have a vehicle practically assigned to them all the time. They do not only carry the men, but their tools and materials as well, and should they only have one or two large jobs the vehicles would be standing idle nearly all day; but if they had 15 or 20 small jobs the vehicles would be moving nearly all day, especialy if the jobs were scattered.

The advantage of the electric over the horse is, that it makes much better time between stops, therefore enabling the men to do more work in a day, and is much more reliable. The advantage of the electric over the gasoline is, that you cannot speed and are less liable to have accidents; besides, the electric is much more reliable and less expensive to maintain.

We have vehicles equipped with electric winches, operated from the battery, for loading the trucks, pulling cables underground, raising poles, hoisting large transformers on poles, pumping out manholes, raising and lowering towers, etc., etc.

We also have a portable pipe cutting and threading machine which is operated from the battery. This has proved itself to be a great labor and money saver, especially on large jobs.

Below is a list, showing the performance of several trucks in our service during the year 1914:

Class	Total Miles	Days' Service	Average Miles per Day in Service
1,000-lb. service wagon	8,985	300	29.9
1,000-lb. electric shop	12,553	285	44.0
2,000-lb. lamp wagon	11,405	361	31.5
2,000-lb. lamp wagon	11,686	356	32.8
2,000-lb. service wagon (old type)	4,956	294	16.8
2,000-lb. service wagon (old type)	6,227	301	20.6
4,000-lb. stake truck	10,864	299	36.3
6,000-lb. construction wagon	3,039	283	10.7

The New York Edison Company writes: Because of the varied transportation needs of a central-station company, electric trucks of the New York Edison Company include a miscellany of styles and types. Perhaps it is not too much to say that no other field presents such varied demands as the lighting of a large city places upon the transportation department of the electric company. There are small, light vehicles (operating on the same principle as department store wagons), which deliver lamps to customers. For the delivery of meters, specially designed wagons are provided with padded compartments in order to eliminate the possibility of damage to these delicate mechanisms. For the heavy tasks of handling cable, the trucks are provided with winches which take their current from the vehicle battery; with this equipment the time required for pulling cable into underground ducts has been considerably reduced. Another instance of the use of the winch is seen in the erection of arc light poles. For this work a special truck equipped with a derrick and boom makes the hoisting and setting of the various parts of poles a less difficult task—particularly where the press of city traffic makes close work necessary.

A further illustration of the flexibility of electrics was shown recently in the organization of a group of trucks for setting poles over a stretch of several miles. The first vehicle deposits the various parts of each pole at the designated location; a second truck set the base and erected the steel shaft; a third, equipped with a derrick, hoisted the ornamental casing over the top of the tube; a fourth mounted the lamps while a gang of painters traveled with the fifth. The foreman supervised the operation of all five by means of an electric surrey.

Emergency wagons, wagons for the supply of miscellaneous material, tower wagons for trimming arc lights, inspection wagon for supervising the street lights at night, and passenger cars make up the balance of this varied electric truck installation.

The Edison Company has been using electric trucks for more than twelve years, the fleet during that time increasing from an original installation of two cars to the present equipment of 108. The durability of the machine is evidenced by the fact that the original two are still in service.

The Commonwealth Edison Company writes: For 15 years the Commonwealth Edison Company has been using electric vehicles in the daily routine work of a large central-station company. That the experience of the company is satisfactory is shown by the fact that it had, on September 15, 1915, 127 electric vehicles in use. The classification of these vehicles, according to carrying capacity (exclusive of five-passenger cars) is shown by the following tabulation:

Number	Capacity, Lbs., Each
22	750
22	1,000
9	1,500
4	2,000
49	3,000
10	4,000
1	5,000
3	7,000
1	10,000
1	12,000
122	

As shown by the above list, the most popular size of electric truck in the service of the company has a rating of a ton and a half, while among the very large vehicles there is one five-ton truck and one six-ton truck.

Electrical readers will be interested, no doubt, in knowing the varied purposes to which these 122 commercial electric vehicles are put. This classification is shown in the following tabulation:

Hauling supplies from storerooms to customers' premises	21
Delivery of incandescent lamps to customers' premises	15
Overhead and underground line work	33
Installing and removing meters, signs, etc.	40
Hauling reels of cable, tile and other heavy work	5
Miscellaneous	8
	122

The company's experience with the work done through a long term of years has convinced it that from the viewpoints of both cost and prompt service to customers, the electric wagon is the best available means of local transportation on account of the low cost of operation and the high mileage obtainable.

The electric vehicles used in overhead and underground line work are especially economical when compared with the horse-drawn vehicle. Here the electric truck makes a good showing in the saving in the time of the workmen who are sent out with the vehicle. Sometimes there are from four to eight men on a service wagon or a construction wagon and the greater mileage of the electric truck enables the men to accomplish considerably more work in the course of a day than they would if they had to depend on a horse-drawn vehicle.

The Electric Vehicle as a Business Builder.

Characteristics of the Battery-Charging Load.

This article, which deals in an interesting manner with the immense possibilities of the battery-charging load from the central-station standpoint, was taken from a paper presented at the recent convention of the Indiana Electric Light Association by Q. A. Brackett.

If there is one subject that is more important than almost any other to the modern central station, it is the building up of the off-peak load. During the last decade, the size of central stations has increased by leaps and bounds, and the number of plants throughout the country have increased tremendously. However, nearly all this great growth has been along the line of service that adds mostly to the peak load. Great quantities of additional generating equipment have to be purchased at great expense only to have the greater part of it idle more than half the day. Increasing business inevitably carries with it increasing overhead expense, both for equipment and for service, so that the benefit is largely neutralized. This is especially true of an increasing lighting load, since so many customers of this class really bring no direct profit to the central staton, because the yearly income from these customers is too low to pay the company's fixed charges for distribution circuits, meters, meter reading, etc., that are largely independent of current consumed. It is, therefore, extremely desirable to obtain as customers those whose requirements will not only come during the off-peak period, but will be large enough to insure a real profit. It will be found that the electric vehicle owner is one of these.

There are two classes of off-peak loads, day loads and night loads. Much has already been done by central stations towards increasing the off-peak day load. This has largely taken the form of pushing the sale of electric heating and cooking appliances, and the development of the motor load. The former has the fault that it depends on the use of small units, most of which are in service but a short time on each occasion, and not every day by any means. Then, too, they are distinctly in the nature of luxuries in many cases, and this tends to limit their use. The motor load is frequently of low power-factor, and coming on and off suddenly and frequently as it does, it makes voltage regulation more difficult and introduces considerable trouble. Neither of these classes of service can be utilized by the central station itself, but it must all be sold to more or less unwilling customers.

To fill in the light load period between midnight and morning, however, little has been accomplished, although this is the period that needs attention most of all.

There is nothing so well suited for a night load as the charging of storage batteries, since it possesses almost every characteristic to be desired for an off-peak night load, viz.:

(1) It is an all-night load, filling in the worst hollow in the load curve during the small hours of the morning.

(2) It is a long-continued load, that is, not a fifteen-minute load, like cooking devices.

(3) It is a frequent load that will occur almost every night, whereas a sad-iron in many cases is used but once a week.

(4) All customers of this sort represent comparatively heavy loads, many times greater than the average lighting load, and equal to six sad-irons at the very least.

(5) Battery charging is a steady load of good power-factor and is not subject to sudden changes like a motor load.

There are a number of things that at present deter the public from using electric vehicles to a greater degree than they now do, and the principal of these is lack of knowledge and example, while the second is lack of cooperation by the central stations.

The first thing that a central station must do to increase the use of electric vehicles in its territory is to make special rates for power when used for off-peak charging, and advertise this fact conspicuously. This will not only encourage the use of electric vehicles by making their cost of operation lower than that of other types, but will psychologically help push the campaign by virtue of the advertising and because it puts the bargain idea prominently before the prospective user.

The second step should be to educate the public as to the advantages of the electric vehicle and its real economy over other types. The general public can and should be educated by a general publicity campaign, including advertisements in the papers, posters, and exhibits at the companies' showrooms, leaflets inclosed with monthly lighting bills, etc. Posters in the street cars are an effective way of reaching large masses of the people, and where the central station controls the street cars, there is no cheaper way.

There is no form of advertisement, however, so effective as example. It is, therefore, of first importance to get the use of electric vehicles started. The first and obvious method is for the central station to introduce them for their own use as repair wagons, etc. In fact, it would be rather useless to urge them upon the public if the central station did not find them worth while themselves. Then, too, their use by the electric station is self-evidently advisable for the sake of what off-peak load they give even if an actual campaign to interest the public is not thought worth while. Assuming that the central station does adopt electric vehicles for its own use, the example thereby set can be conspicuously advertised on the cars themselves, thus getting the full effect of the example.

The next step after adopting electric vehicles itself is for the central station to concentrate its efforts especially on one or more of the large interests of the city, who use a number of delivery vehicles. If one such concern can be gotten to adopt electric vehicles and if the central station sees to it that it is so coached on their care and operation as to obtain especially satisfactory results, this will be one of the most effective arguments possible in making others follow the example. There are numerous applications of this sort that have been successful in the past. These are primarily short-haul propositions, such as delivery service for department stores, wholesale houses, etc. Another successful application of electric trucks is for handling the mails instead of mail wagons. As an example of this, note the recent adoption of electric vehicles for that purpose in the City of Boston, by the company that holds the contract for transporting the mails. Not only is this expected to be more profitable for the company than the older method, but it will improve the mail service by quickening deliveries throughout the district. It was this latter consideration that caused the Post-office Deparment at Boston to so strongly advocate the adoption of electric vehicles. This shows how outside interests will, for their own advantage, often assist the central station in introducing the electric vehicle.

Another large organization that can usually be persuaded to adopt electric vehicles is the street-railway company for their repair wagons. The same is true of the telephone and telegraph

companies. In both these cases, the negotiation is made easier by the fact that since all are in the electrical business, they are familiar with the care and characteristics of storage batteries and are not deterred by the unfamiliarity with them that exists in the mind of the ordinary business man. In fact, other things being equal, these should be the easiest applications to bring about in any new territory after the adoption of electric vehicles by the company itself.

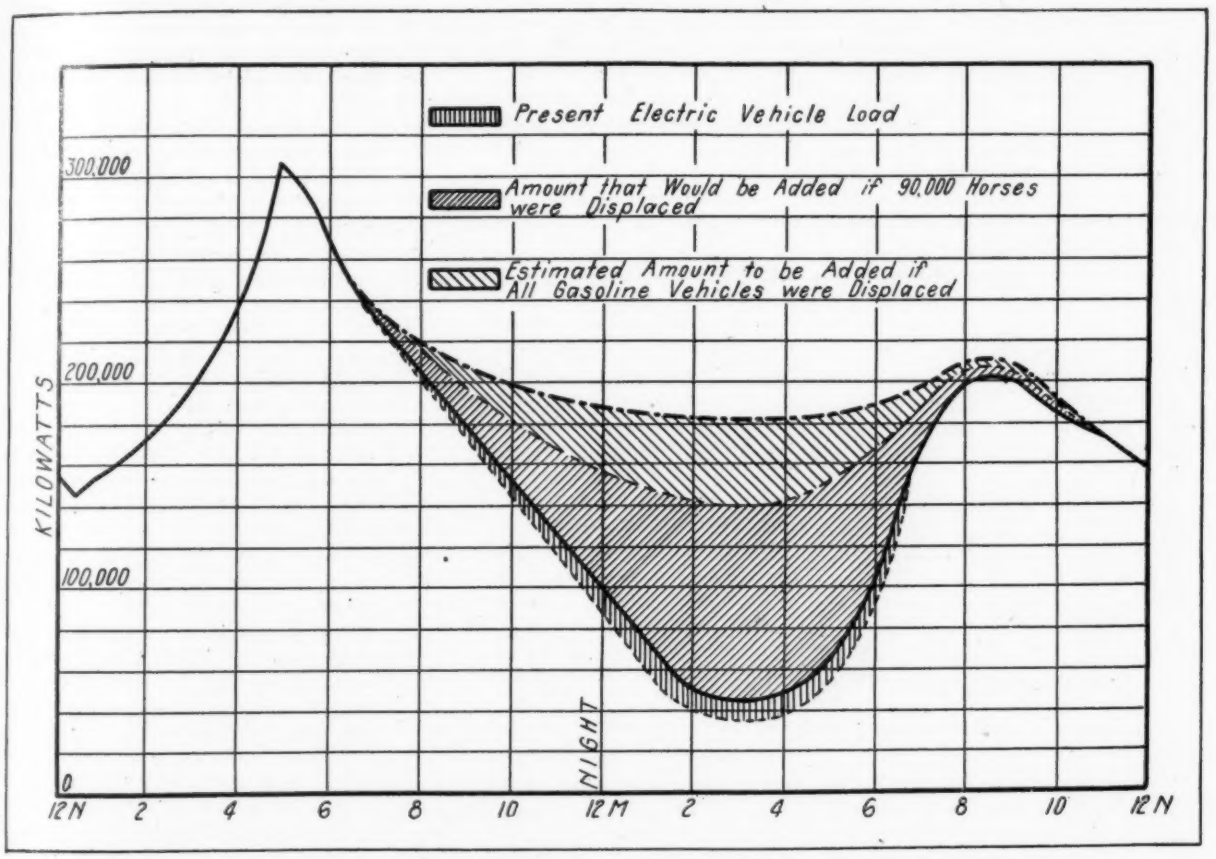
In getting the individual user to adopt the electric vehicle, it may be necessary to do even more than advertise and set an example, and furnish attractive rates for power. The first cost of charging apparatus, low as it is, may deter an otherwise converted customer. In such cases, it may even be advisable for the central station to remove this first cost entirely from the customer's mind, by providing the charging equipment itself for a nominal rental, the customer to pay all maintenance expenses. Two dollars a month would cover the interest and depreciation, for instance, on an average-size rectifier equipment. In cases where it would not conflict with a local agent, the central station might even help its customers save money, by handling the purchase of vehicles for all its customers, and giving them, in the form of a rebate later in the year, the advantage of any quantity discount obtained according to the number of vehicles sold in the district, per year. This would make all the first purchasers boost electric vehicles to their friends for all they were worth, so as to get enough vehicles sold to insure their own discount. The central station would thus have a corps of able men working for their interests for nothing, which, in most lines of endeavor, would be considered well worth while.

For a number of years, a commercial electric vehicle has always meant a fairly large and quite expensive truck which only large concerns dealing in heavy merchandise would buy. Lately, however, light electric delivery wagons, costing less than a thousand dollars, have appeared on the market, and these open a whole new field for the application of electric vehicles to the delivery service of bakeries, grocery and provision stores, light express service, etc., where the one-horse team is so common nowadays. The same conditions of economy hold here as in the cases of the larger trucks. The columns of the leading electrical papers have repeatedly shown the greater economy of operation of electric vehicles within their proper sphere over both gasoline and horse-drawn vehicles. This usually amounts to a saving of from 20 per cent to 50 per cent over the cost of operating an equivalent gasoline truck. This means a great deal in dollars and cents in the course of a year.

But the electric truck is only one phase of the electric vehicle proposition. The pleasure car is almost equally important from the central-station standpoint, although it usually represents a somewhat smaller unit and one that is charged less often. Nevertheless, the average pleasure vehicle requires about 20 kilowatt-hours per charge, and if charged 15 times a month, this represents at a five-cent rate for power an income of $180 per year from each car. This is far more than the income from the average lighting customer, in spite of all the sadirons, toaster stoves, etc., that he may use, even at a 10-cent rate for power. And it is nearly all clear gain, since the load all comes during the small hours of the night when the load is lightest and since it requires practically no new expense on the part of the company.

In the case of the larger commercial vehicles, the load is even greater, averaging, say 30 kilowatt-hours per charge with 25 charges per month, or about $450 per year income to the central station at a five-cent rate.

The superiority of the electric pleasure car for town use, and especially for



Load Curve of the Commonwealth Edison Company Showing Importance of Battery-Charging Load.

ladies, is no longer disputed. Its quietness and air of luxury makes it especially appropriate for society use, while its utter cleanliness, its simplicity of operation, and its absolute freedom from operating troubles, such as are liable to occur with even the best gasoline engines with their valves, carburetors, ignition system, gears, etc., place it in a class by itself. This is especially true for the woman who wants to drive for herself, even when gowned in her best for an afternoon party. For doctors, also, who want a car that will be always ready, and never fail to start in an emergency, or for people of quieter dispositions, who have not the mania for high speed or cross-country touring, the pleasure electric especially appeals.

It is necessary, however, for the central station to do more than encourage the use of electric vehicles and provide attractive rates for power. It is necessary to provide facilities for charging the car batteries and to advise the owners as to the proper methods to adopt.

It is unquestionable that some customers will prefer to pay to be relieved of all trouble in caring for their batteries and will have them charged at a public garage. On the other hand, many customers will prefer to save expense by charging them themselves, or will be so situated that there is no electric garage at all convenient. The man who would charge at home, must be helped with advice as to what charging equipment he needs and must be coached in its use, so that he will get good results and not become prejudiced against the electric vehicle because of battery trouble brought on by improper charging.

The man who prefers to have his car charged at a public garage, must be looked after, by seeing to it that a sufficient number of public garages are equipped and trained to give good service along this line.

The charging equipment that is best suited for the man who charges his own car at home, is not necessarily the best for the public garage. The conditions differ widely, and a choice must be made between the various types of charging apparatus that are available.

These are divided into two main classes: motor-generator sets and mercury rectifiers. The former can be made in any size that is required, whereas the maximum capacity of the latter is 50 amperes, direct current. It, therefore, follows that for public garages, where a large number of cars are to be charged at once, the motor-generator set or rotary converter are the only devices to be considered. These should be chosen of a size large enough to take care of a reasonable growth of business during the near future.

For private garages, where only a single car need be charged at a time, the mercury rectifier is amply large enough to suit all requirements. The choice of a charging device hinges, therefore, on their relative advantages, or the preference of the user. Their relative advantages depend partly upon their inherent characteristics and partly upon the conditions under which they are to be used.

In the foregoing, the writer has endeavored to point out the advantage of developing the use of electric vehicles in the territory supplied by any central station, showing how the charging of the vehicle batteries brings about an off-peak load of most desirable characteristics and size, and occurring at the time most desirable from the central-station viewpoint, namely, during the small hours of the morning.

It has been shown that a single pleasure vehicle will bring in nearly $200 per year to the central station, while a truck will bring in $400 or $500 per year, all for current delivered during the worst part of the off-peak period.

Certainly, this would seem to warrant vigorous and unceasing effort on the part of the central stations to obtain and build up this load and to assist in every way the growth of the use of electrical vehicles. Suggestions have been made as to ways to accomplish this and as to methods of handling the load, once it is obtained.

It is only a question of time before the advantage of the electric vehicle to the central station is universally recognized, and until more systematic efforts are everywhere made to encourage its use.

Electric Vehicle Making Long Cross-Country Run.

Excellent progress is being made by the Ward special, an electric delivery wagon, which is making the long cross-country trip from New York to Cleveland. This vehicle started from the Grand Central Palace at 2:30 Wednesday afternoon, October 6, coincident with the opening of the annual New York Electrical Exposition and Motor Show. It reached Peekskill the same evening and on Thursday ran through to Albany.

According to the report of John Delahant, the expert of the New York Electric Vehicle Dealers' Association, who is accompanying the vehicle as official observer, 111 ampere-hours of current were consumed in making the run from the Palace to Peekskill, a distance of 45 miles and at Ossining the battery was given a boost of 80 amperes for one hour, because a detour was found necessary.

On Thursday this delivery wagon which by the way is carrying its rated capacity load of 750 pounds, made the run from Peekskill to Albany, stopping at Poughkeepsie to have its battery boosted.

THE NEED FOR REDUCING THE NUMBER OF STANDARD WHEEL AND TIRE SIZES FOR ELECTRIC VEHICLES.

By Paul W. Kerr.

The Society of Automobile Engineers in 1911 adopted a standard of dimensions for all truck wheels and tires. This standard provided a schedule of diameters varying by two-inch steps from 32 to 42 inches and a schedule of seven widths, varying from 2.5 to 7 inches, making 42 possible sizes in all.

The immediate adoption of this standard by all manufacturers of the lines affected, was ample proof of the value of the S. A. E. recommendation.

General practice and thorough investigation conclusively proved such a large variety of wheel diameters unnecessary for truck efficiency and impractical, for, with the expansion of the industry, tire manufacturers, especially, found it practically a physical impossibility to carry complete stocks and render efficient service in all of the 150 or more cities having at least 25 trucks. As a consequence, in the fall of 1913, the S. A. E. revised its former standard, eliminating all diameters but 32 inches, 36 inches and 40 inches, still retaining the former schedule of widths, thus making 21 different sizes. Strictly speaking, the 32-inch diameter was tentatively retained to take care of a few small electrics, but later recommended for elimination, leaving only the 36 inches and 40 inches and 14 sizes.

The general adoption of this present standard will afford even greater advantages than the former did. Such a simplification will enable tire manufacturers to carry complete stock in all service stations, thus raising the standard of tire-renewal service to the highest point of efficiency; will have a decided tendency to satisfactorily increase export business and aid the progress already made toward an international standard.

Although manufacturers of electric vehicles have not adopted these standards as rapidly as builders of gas trucks, they have showed a decided tendency in this direction. Highly efficient service and low cost for renewal parts are most vital to the success of a general intensive truck sales campaign. Nothing will do more toward bringing about this desirable condition than a complete adoption by the electric vehicle manufacturers of the present S. A. E. standard.

National Independent Telephone Association Convention.

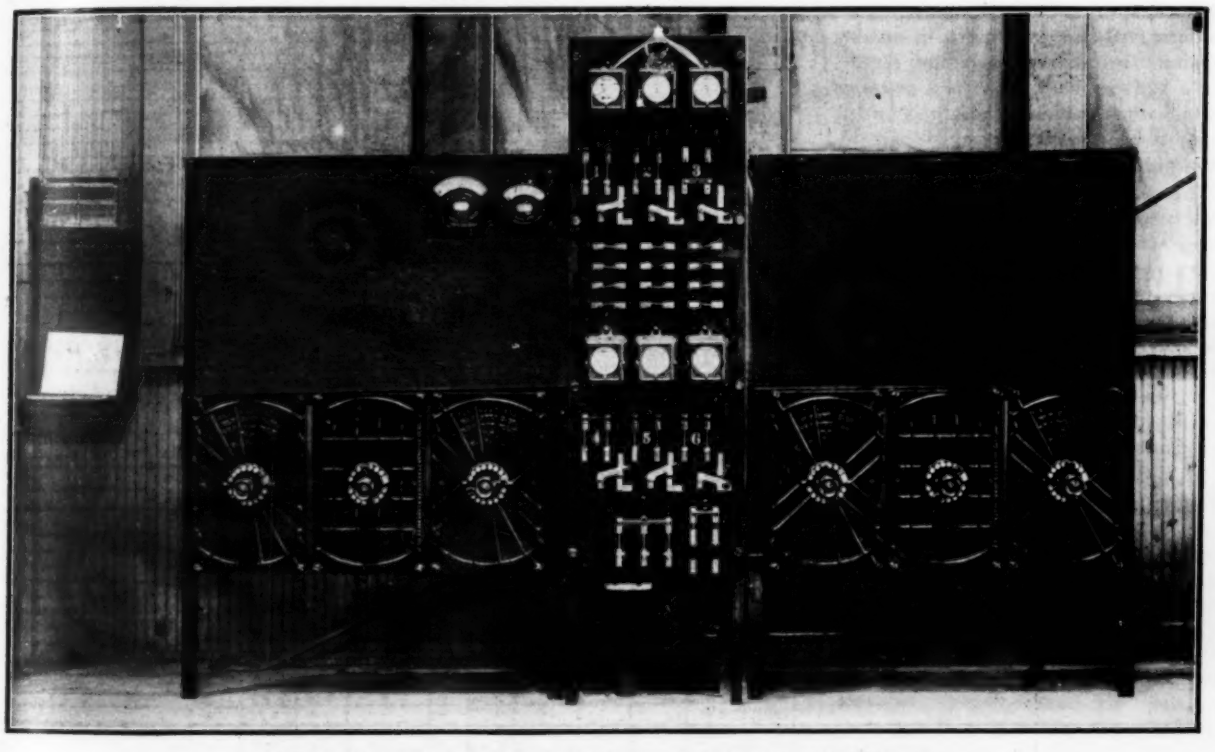
The annual convention of the National Independent Telephone Association will be held in Hotel La Salle, Chicago, Ill., on December 8 to 10.

An Electric Commercial Car Garage in Chicago.

Details of an Innovation That Fills a Long-Felt Want.

An exclusively electric commercial vehicle garage recently opened in Chicago is described in this article. Rates are based on the energy consumed by each vehicle, plus a storage charge, and surprisingly low operating costs are revealed by the records which are kept by the garage for each vehicle.

There is no single item that will contribute more to the greater use of electric commercial vehicles, especially of the small package-delivery type, than the establishment at convenient points in a city of exclusive commercial garages, where such vehicles can be stored and charged under competent supervision. The small manufacturers and merchants, say those having need for only one or two light delivery wagons, will hesitate to install expensive charging equipment, even though realizing the advantages and economies that would accrue from the use of electric cars. Yet these same men could, in many cases, be interested if convenient garages were available, where the vehicles could be stored and where the batteries could be charged by competent attendants.



Charging Board in Electric Service Garage Showing Individual Meters.

Almost as essential as the garage itself is a proper basis of charging. It is obviously unfair to charge a user of a 1,000-pound wagon, who uses his car 3 or 4 hours a day, covering from 8 to 10 miles, the same rate as the 1,000-pound wagon which operates eight hours per day, covering a radius of say 20 miles. Passenger-car garages indicate their willingness to accommodate commercial vehicles, yet maintain flat rates based on the size of the vehicle, rather than on the cost of furnishing garage service to any individual user.

The "Electric Service Garage" in Chicago is the first public electric garage devoted exclusively to commercial cars, and its influence on the vehicle business in the territory it serves will be watched with interest. Previous to the establishment of this garage such electrics as were in the neighborhood either had to be stored in gasoline garages or in electric passenger-car garages. In the former case the assistants who are employed in gasoline garages are inexperienced in the proper care of the electric, and in the passenger garage proper facilities are usually not available for the repair of electric trucks, which are usually considered as a side issue to the passenger-car business and consequently neglected.

In this new exclusively electric commercial garage, where only those are employed who are familiar with electric trucks, every attention will be given to receiving the vehicle, charging or repairing it, and placing it again in satisfactory service.

Operated in connection with the garage is a machine shop equipped with modern tools and intended to provide means for making any kind of repairs to electric trucks. In fact, with the equipment installed complete trucks could be built. At present this machine shop is used for general outside repair work, but as the truck industry develops in this district it is expected that the shop will be kept busy on truck repairs exclusively. It may be stated that as such garages are established throughout a city the machine shop could well be made the permanent adjunct of such establishment, and during the early life of the garage provide a source of income that would permit of at once establishing low rates for garaging service. With the garage business of such a combination establishment developed to its highest point the machine shop would become a valuable asset for vehicle repairs and replacements alone. The average garage when confronted with repairs demanding special equipment to construct finds it necessary to send the

broken parts to similar machine shops, or even back to the vehicle factory. The vehicle consequently remains out of service, with a loss to its owner and the garage.

Located at Halsted and Fulton Streets, in the heart of a heavy traffic district, the garage is properly situated to take care of the many electric trucks plying between the downtown district and the north and west sides of the city, many of the trucks delivering and receiving at the nearby railroad freight depots.

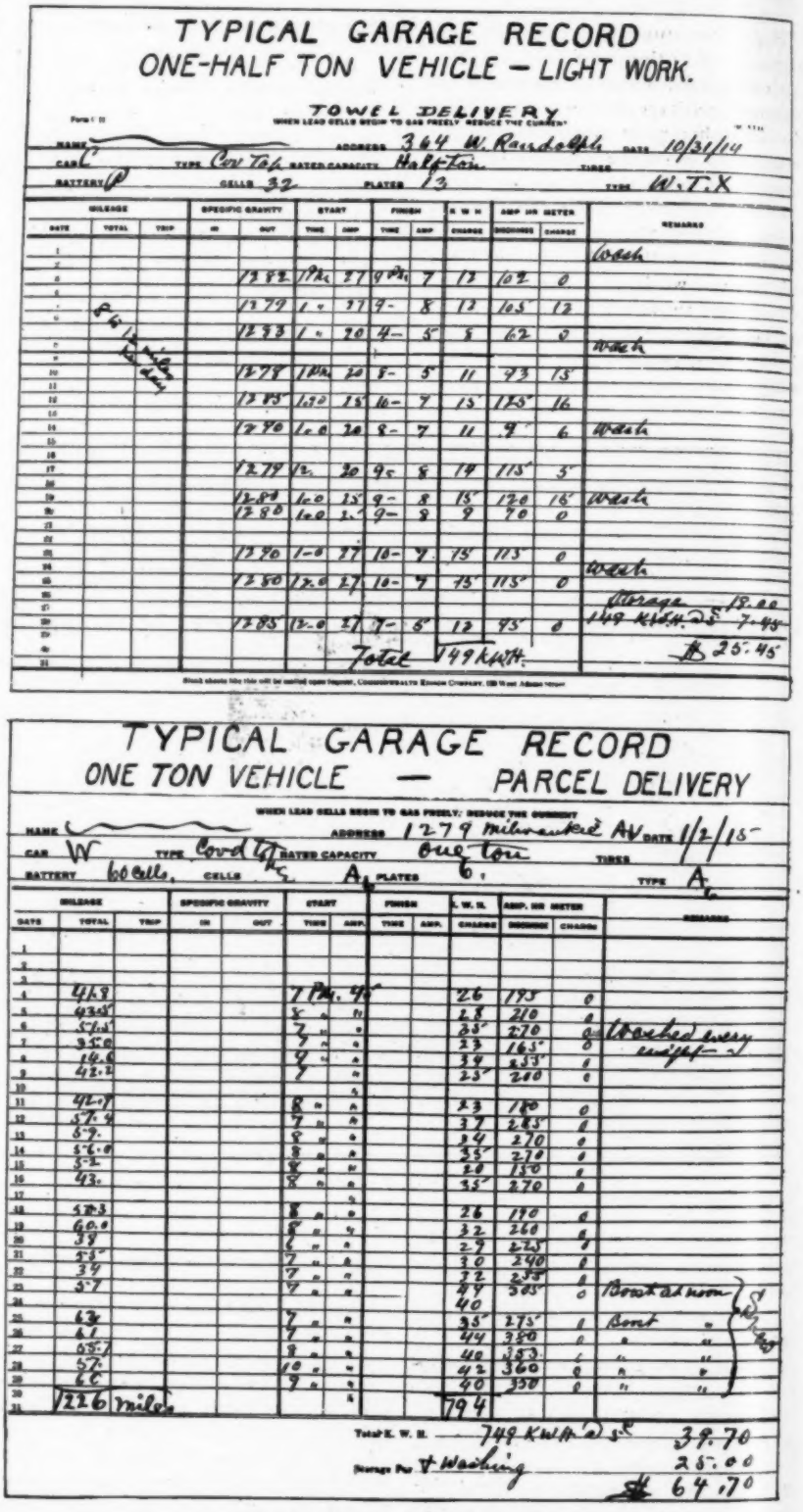
Easily accessible from the street, and also the shipping yards of the railroad terminals, the building is so divided that the garage proper extends the extreme length of the building, the machine and repair shops being located on a balcony above, to which trucks, bodies or chassis can be easily removed by means of an electric hoist. This modern facility means much in making repairs. In the average garage, removing a body or heavy part is a phase of repair work which is often avoided, thereby leaving the damaged part inaccessible.

The balcony platform is equipped with a specially built switchboard, the rheostats and wiring being of extra heavy quality in order to carry a large amperage. As shown in the illustration, the board has six rheostats and six meters. Each meter is so connected as to indicate the kilowatts used for charging, the charging expenditure being based absolutely on a flat rate of five cents per kilowatt-hour consumed.

In order to assist truck users in avoiding delay while charging, it is possible to connect the charging outlets in pairs; two outlets in each outlet box, each box provided with a double-pole knife switch, so that each pair of charging outlets may be connected in parallel to give boosting charges of 160 amperes. This fast and heavy boosting is exceedingly valuable. Truck drivers can drop in at any time, especially during the noon hour, and place their vehicles on a quick, heavy charge sufficient to last them for the remainder of the day. The charging plugs are located and extend along the edge of the balcony and are easily accessible to the trucks below.

As soon as the vehicle has received a sufficient charge, a reading is taken from the meter. This reading, the former reading, and the kilowatt-hours consumed are recorded together with the mileage, type of truck, tire and battery equipment, on a blank card bearing the owner's name and address. Each card is tacked to a drawer and acts as a separate file when placed in the cabinet, as shown to the left of the switchboard in the illustration. At the end of the month a bill is rendered, the data on the card report showing the exact work done, and the cost of the month's operation. By the use of this unique method the truck user has a permanent record from which he can estimate the saving or loss arising from his vehicles.

The accompanying records are typical of the costs of vehicles kept in this garage. Reference to these records will emphasize the unfairness of charging a flat rate, even for vehicles of exactly the same size. It may be added that even with the low rates indicated by the records the business is profitable to the garage.



TYPICAL GARAGE RECORD
ONE-HALF TON VEHICLE — LIGHT WORK.

TOWEL DELIVERY

NAME [illegible] ADDRESS 364 W. Randolph DATE 10/31/14
CAR C TYPE Cov Top RATED CAPACITY Half Ton TIRES
BATTERY C CELLS 32 PLATES 13 TYPE W.T.X

DATE	MILEAGE TOTAL	MILEAGE TRIP	SPECIFIC GRAVITY IN	SPECIFIC GRAVITY OUT	START TIME	START AMP.	FINISH TIME	FINISH AMP.	K. W. H. CHARGE	AMP. HR. METER READINGS	AMP. HR. METER CHARGE	REMARKS
1												
2												Wash
3				1282	1 Pm.	27	6 Pm.	7	12	102	0	
4				1279	1 "	27	7-	8	12	165	12	
5				1273	1 "	20	4-	5	8	62	0	
6												Wash
7												
8				1278	1 Pm.	20	8-	5	11	93	15	
9				1275	1.30	15	10-	7	15	135	16	
10				1270	1.0	20	8-	7	11	9	6	Wash
11												
12				1279	12.	20	9-	8	14	115	5	
13				1289	1.0	15	9-	8	15	120	15	Wash
14				1280	1.0	2.	9-	8	9	70	0	
15												
16				1270	1-0	27	10-	7	15	115	0	
17				1280	12.0	27	10-	7	15	115	0	Wash
18												
19												Storage 15.00
20				1285	12.0	27	7-	8	12	95	0	149 KW.H. @ 5 7.45
21							Total		149 KWH.			$ 25.45

Blank checks like this will be mailed upon request, COMMONWEALTH EDISON COMPANY, 139 West Adams Street

TYPICAL GARAGE RECORD
ONE TON VEHICLE — PARCEL DELIVERY

WHEN LEAD CELLS BEGIN TO GAS FREELY, REDUCE THE CURRENT

NAME [illegible] ADDRESS 1279 Milwaukee Av DATE 1/2/15
CAR W TYPE Covd Top RATED CAPACITY One Ton TIRES
BATTERY 60 Cells CELLS A PLATES 6 TYPE A

DATE	MILEAGE TOTAL	MILEAGE TRIP	SPECIFIC GRAVITY IN	SPECIFIC GRAVITY OUT	START TIME	START AMP.	FINISH TIME	FINISH AMP.	K. W. H. CHARGE	AMP. HR. METER READINGS	AMP. HR. METER CHARGE	REMARKS
1												
2												
3												
4	418				7 Pm.	40			26	195	0	
5	433				8 "	41			28	210	0	
6	57.3				7 "	4			35	270	0	Worked every
7	35.0				9 "	4			23	165	0	evening —
8	14.6				9 "	4			39	293	0	
9	42.2				7 "	4			25	240	0	
10						5						
11	42.7				8 "	4			23	180	0	
12	57.4				7 "	4			37	285	0	
13	57.				8 "	4			34	270	0	
14	56.0				8 "	4			35	270	0	
15	5.2				8 "	4			20	150	0	
16	43.				8 "	4			35	270	0	
17						5						
18	523				8 "	4			26	190	0	
19	60.0				8 "	4			32	260	0	
20	39				6 "	4			27	225	0	
21	58				7 "	4			30	240	0	
22	39				7 "	4			32	255	0	
23	57				7 "	4			44	365	0	Boost at noon
24									40			
25	63				7 "	4			35	275	0	Boost "
26	61				7 "	4			44	350	0	" "
27	65.1				8 "	4			40	353	0	" "
28	57.				10 "	4			42	360	0	" "
29	66				7 "	4			40	330	0	" "
30	226	Miles							794			
31												

Total K. W. H. 749 KW.H. @ 5¢ 39.70
Storage Per Y Washing 25.00
$ 64.70

Records Kept by Service Garage.

Electrical Exports for July.

The following data on the electrical exports of the United States for July are obtained from the monthly summary of foreign commerce for that month just issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C.

In July the total value of the electrical exports exceeded that of all months since December, 1913. For the four classes for which the number of articles exported is reported there were shipped the following: Fans, 2,234; arc lamps, 19; carbon-filament lamps, 86,757; metal-filament lamps, 358,606.

In the following table are given the detailed figures for last July and for the corresponding month of a year ago:

Articles	July, 1915	July, 1914
Batteries	$ 91,344	$ 59,714
Dynamos or generators	156,191	195,983
Fans	28,438	23,629
Insulated wire and cables	187,379	127,697
Interior wiring supplies, etc. (including fixtures)	80,933	45,077
Lamps—		
Arc	433	1,672
Carbon-filament	9,715	3,143
Metal-filament	55,929	13,581
Meters and other measuring instruments	55,463	31,585
Motors	381,695	161,798
Telegraph instruments including wireless apparatus)	8,536	5,340
Telephones	101,277	59,347
Transformers	73,292	72,443
All other	916,682	614,351
Total	$2,147.307	$1,415,360

Lynn Section Meetings.

The first meeting of the Lynn Section, American Institute of Electrical Engineers, for the season was held October 6, when H. A. Hornor, electrical engineer, New York Shipbuilding Company, gave an interesting lecture on the subject, "Battleships—Their Fabrication and Electricity's Part Therein." By means of lantern slides the descriptions were made very clear to the large audience.

The program for the balance of the season will be:

October 20—"Glaciers of Alaska," lecture by C. A. Adams, professor at Harvard University.

November 3—"War Surgery in France," by Edward Hall Nichols, surgeon and professor in Harvard Medical School.

November 7—"A Trip to the Argentine Republic," by J. A. Shipton, U. S. A.

December 1—"American Shipbuilding," by J. W. Powell, president of Fore River Shipbuilding Company.

December 15—"The Effect of Legislation Upon Our Industries," by A. G. Duncan, president, National Association of Cotton Manufacturers.

January 5, 1916—"Telescopes," by John A. Brashear.

January 22—Banquet.

February 2—"How New York Gets Its Electric Light and Power," by H. H. Barnes, Jr.

February 16—"Illumination at the Panama-Pacific International Exposition," by Walter D'Arcy Ryan, chief of illumination. Joint meeting with the New England Section of the Illuminating Engineering Society.

March 1—"Light, Shade and Color in Illumination," by M. Luckiesh, Nela Research Laboratory.

March 15—Lecture by Elihu Thomson.

Convention of Colorado Association.

The thirteenth annual convention of the Colorado Light, Power and Railway Association was held at Glenwood Springs on September 23, 24 and 25.

The party left Denver in three special Pullman sleepers and a club car the night of September 22 over the Denver and Rio Grande Railroad, and arrived at Glenwood Springs the next morning. There was a total in attendance of 92.

The first session was called to order by President Raber at 2 p. m. on Thursday. The first paper presented was entitled "Keeping Appliances in Use After They are Sold," and was presented by Miss Jane Aldred, of the Colorado Power Company. Miss Aldred dwelt on the different methods of selling appliances, demonstration thereof and the necessity of the central station keeping after appliances after they are sold so that they will be used.

The next paper presented was "Rate Making to Stimulate Other Than Lighting Uses," by Franklin P. Wood, of the Trinidad Electric Transmission, Railway and Gas Company. Mr. Wood went in some detail into the method of his company to attract power users, particularly the smaller user, and suggested the use of a sliding scale of prices so that, as the power bill tended to increase, the rate would drop off, which would encourage the use of a greater amount of current.

Mr. Hammond of the Colorado Power Company did not agree with Mr. Wood and maintained that such a rate would tend to confuse the small consumer as he would not readily grasp such a rate. Mr. Hammond offered as a substitute the rate published by his company. This rate, which Mr. Hammond said was becoming very popular on his lines due to its ease of comprehension, consisted of a twelve-cent rate for the first ten kilowatt-hours and a six-cent rate for all in excess, both being subject to a ten-per-cent reduction for prompt payment.

Mr. Doane, of the National Lamp Works, agreed that Mr. Hammond was working along the right lines, but said he believed in some future time the rate to the consumer would be based on the value of the service to the consumer rather than on the basis of its cost to the central station for manufacturing. Mr. Doane also stated that a rate which should be satisfactory to all parties would be one whereby a set charge was made per room for residential consumers.

Following this discussion was a paper by W. N. Casey, of the Denver City Tramway Company, entitled "Present-Day Problems of the Street Railway." In this paper Mr. Casey went into some detail on the inroad the jitney bus was making in the receipts of some street-railway companies and also took up the effect of the automobile upon the earnings of the street-railway companies.

Friday was given over to the reading and discussion of papers prepared and presented by the Colorado Public Utilities Commission, as follows:

"Valuation of Public Utility Properties," by F. J. Rankin, engineer of the Commission.

"A Uniform System of Accounting," by F. W. Herbert, auditor of the Commission.

"The Indeterminate Franchise and the Certificate of Public Necessity and Convenience," by M. H. Aylesworth, attorney for the Commission.

"Depreciation as Affecting Valuation and Assessments," by D. W. Knowlton.

An evening session was made interesting by the presentation of a paper, "The Electric Range," by B. S. Manuel, of the Westinghouse Electric and Manufacturing Company.

C. N. Stannard, of the Denver Gas and Electric Light Company, went into the details of the "Electrical Prosperity Week," for the benefit of the members of the Association who did not thoroughly understand what was being attempted.

Saturday morning was given over to the presentation and discussion of two papers.

"Improvements in Mazda Lamps," by S. E. Doane, of the National Lamp Works. Mr. Doane spoke to some extent on the type C lamp, explaining the reason of manufacture and speaking of the possible improvements.

The second paper, "Modern Store and Window Lighting," by R. Arnold Lewis, of the Edison Lamp Works, went into some detail regarding the design of several different typical installations and gave tables for determining the illumination of stores and windows.

The last session of the convention was the executive session, at which John J. Cooper, of the Arkansas Light and Power Company, was elected president of the Association for the ensuing year, with L. P. Hammond, general manager of the Colorado Power Company, as vice-president.

Electrical Construction

TESTS OF SPLICES IN GALVANIZED IRON WIRE.

By Terrell Croft.

The following paragraphs record the results of a series of tests made by Warren S. Simmons and the writer in the laboratories of Pratt Institute, at Brooklyn, in 1902, while they were students at that institution. The gist of the information thereby obtained appeared in the Pratt Institute "Science and Technology Annual for 1901 and 1902." Extracts from this report have in several instances been printed in the electrical magazines. Inasmuch as requests for additional information regarding these tests have been received, a fairly complete description of the tests made and an outline of the conclusion reached is given herewith.

In practical line construction there are several types of twisted wire joints in use, each of which has its advocates. The intention of this investigation was to find, if possible, which of these is the stronger and better, and at the same time to find the dimensions for the most efficient splice for each of the sizes of wire generally used. The joints were tested unsoldered at first, as in many cases it is unprofitable so to treat them, especially where the wire is used only to support a strain, as in guying, where the electrical conductivity is not a factor.

Unfortunately in the laboratory it is impossible to exactly reproduce conditions met with in practice. As a rule when wires are broken out on the line, the rupture is caused by a sudden strain such as a tree falling on the middle of a span or a pole toppling over. In these cases the strain comes so suddenly that probably the wire would break before a joint would have time to untwist, even if the joint were made ever so poorly. It is practically impossible to measure accurately in the laboratory the force of a sudden blow, so the joints could not be tested in this way. But the tests were made on an Olsen testing machine, on which the load steadily increases until the specimen breaks. A machine of this kind reproduces a strain such as a guy wire would be called upon to sustain, or such a one as would be caused by changes of temperature. At any rate, when we have a joint that will sustain as much as the wire itself, we have all that can be desired of it, and the tests were therefore made to find out how the different joints compared in tensile strength with this standard.

In Figs. 1, 2, 3, and 4 are shown some of the types of joints in use. From the illustrations it is evident that there are two components in a twisted joint: *first*, the short turns around the wire at each end, and *second*, the long twists in the middle or the "neck." The effect of each of these was tested separately. No. 12 iron wire, which was found to break at 475 pounds, was used in preliminary tests.

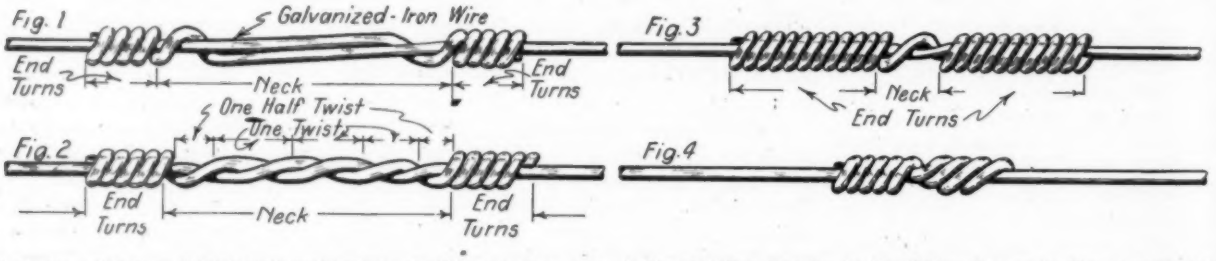
To find the effect of the short turns, the tests shown in Table I were made The specimens were all wrapped with one twist in the necks and the short turns at the ends were varied as stated in the table. The results shown are the average of several tests for each type of joint. Referring to Table I, in breaking the joints, with three exceptions out of the thirty-five tested, the joints untwisted down to one short wrap before they broke. When a strain is applied to a connection of this type the wires are gradually pulled apart, the length of the joint decreasing, the short turns turning around the main wires as the tension is increased, and usually, if the stresses are continued, the wires will untwist entirely, although in some cases, especially with the large-size wires, they may break when there are but two or three of the short turns left.

From the results it is evident that it would be impossible to make a joint of this type, of reasonable size, the strength of which would even approximately equal that of the wire of which it was made. Also it is apparent that increasing the number of short turns above four or five does not strengthen the splice materially.

To find the effect of the twists in the neck of the joint the tests shown in Table II were made. Specimens for these tests were all wrapped with two short turns at each end, and the twists in the neck were varied as shown in the table. In each case a neck four inches long was used, this being considered the average length used in practice for No. 12 wire, its length being in about the right proportion to this size wire.

Evidently, from the results shown in Table II, a safe joint, that is, one which will hold as much as the wire of which it is made, should have five or six twists in a four-inch neck.

Where four turns or less were used, the joint would start to slip at a load about one-half the breaking load of the wire; would continue to slip at this



Examples of Splices Which Will Fail Before the Wire Breaks. Fig. 4 Shows What Results to the Splice Shown in Fig. 2 When Subjected to Tension.

TABLE I. (NO. 12 GALVANIZED IRON WIRE).

No.	Number of Short Wraps.	Breaking Load in Pounds.
1	3	195
2	3	242
3	4	264
4	6	266
5	8	240
6	10	247

TABLE II. (NO. 12 GALVANIZED IRON WIRE).

No.	Number of Twists in Neck.	Breaking Load in Pounds.
1	3	230
2	4	230
3	5	475
4	6	475

load or less until it untwisted entirely, or after having pulled down to the short wraps it would break. An example of this is Fig. 4, which shows a specimen of a No. 6-wire joint that had four twists in a seven-inch neck before it was placed in the testing machine. At time of breaking these four twists had pulled entirely down to the short wraps. When a wire breaks after having untwisted from a joint such as the one shown in Fig. 4 was originally, the breaking strength is a little over half the breaking strength of the uninjured wire.

The joints shown in Fig. 5 were made in accordance with the above conclusions, and are probably the most efficient joints for the sizes of wire used. As a few short turns at the ends undoubtedly somewhat increase the strength of the splice and add to its appearance, five of them were placed at each end. Judging from results obtained, there is no benefit from increasing this number.

After the above described tests on

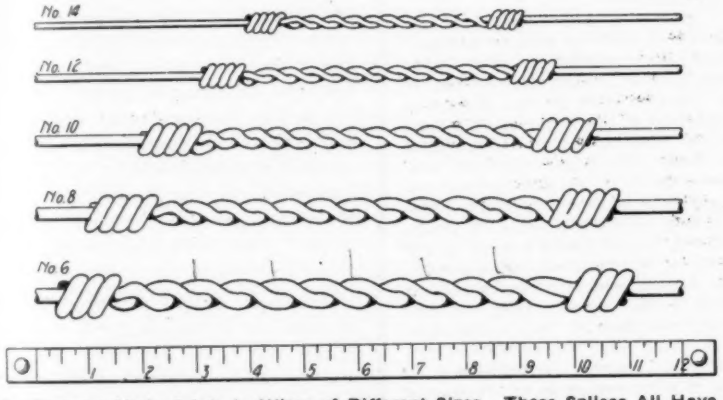


Fig. 5.—Properly Made Joints in Wires of Different Sizes. These Splices All Have Five Twists in Their Necks.

No. 12 wire were completed, the other sizes, viz.: No. 14, No. 10, No. 8, No. 6, were considered. The object sought in the tests on these sizes was to find the number of twists in the neck of the splice necessary to make it as strong as the wire of which it was composed.

The results for the different sizes of wire were so nearly the same that it does not seem necessary to treat each size separately.

It was found that for all sizes of iron wire tested, in order to make a splice of a strength equal to the wire of which it is made, there should be at least five twists in the neck and about five short turns at each end, although joints made with but two or three short turns at the ends often appear to hold as well as those made with more.

In determining the length which the neck should have there are two things that it seems necessary to consider; if the neck is made too short it will not be possible to make the five turns in it (which, judging from results obtained, are necessary) without either "burning" the wire or exercising an unnecessary amount of labor; and secondly, if the neck is made too long, wire will be wasted, and after a certain limit the joint will be weakened. In other words, the proper length of neck is the shortest length that will contain five twists without injuring the wire or making the joint too hard to twist.

The lengths used for joints shown in Fig. 5 are as follows:

No. 14 wire	3.5	inches
No. 12 wire	3.75	inches
No. 10 wire	4	inches
No. 8 wire	6	inches
No. 6 wire	7	inches

To find what effect soldering had on the strength, a few joints were soldered and broken in the testing machine, and it was found that for No. 14 and No. 12 wire even a joint with one twist in neck and one turn at each end would sustain its load, if soldered, while the wire of which it was made would break. On account of lack of time soldered joints of other sizes of wire were not tested.

The splices used were made in the following manner. First, the ends of the wires to be joined were held in the connectors, and with the fingers a length of the wire equal to the length of the neck wanted was given one long twist around the other wire.

Second, the loose end was grasped with the pliers and turned round until the number of twists wished in the neck were formed. Third, the short turns at each end were made.

In making the specimens it was found that unless care was taken to twist the two wires composing the neck equally, more strain would come on one wire than on the other, and the joint would slip or break, whereas if the joint had been properly made with an equal twist in the two wires, the wire itself would break before the splice would give. It was found, however, that when making a splice, if the connectors were held firmly in one hand, and if, while making the twists in the neck with the pliers, they were pulled away from the connectors, putting an equal strain on both wires, the twists could be made to come quite evenly.

Splices of the type shown in Fig. 1 will first pull together as shown in Fig. 3 and then will untwist entirely or break. The joint shown in Fig. 2 is all right as far as it goes, but it will probably stand no more than those of Figs. 1 or 3 because it has not a sufficient number of turns in its neck. The joint shown in Fig. 3 under strain will untwist entirely or break at a comparatively small load after partially untwisting.

Among the Contractors.

The Mid-Western Electric Manufacturing Company, of Baraboo, Wis., headed by M. Debrey, has been awarded a contract for the installation of the electric light and power distribution of the village of Dane. This contract includes installations of street lighting, commercial lighting lines and substation, which will be supplied by current from the Wisconsin Power Company, of Prairie du Sac.

Plans have been completed by Joseph J. Moebs for a new and commodious business property to be occupied by the Carroll Electric Company, Washington, D. C. The structure, which will stand at 714 Twelfth Street, Northwest, will be three stories high, of tapestry brick, trimmed with limestone and bronze plaques and cornices. On the first floor will be located the store and showrooms, the front containing two large show windows, between which will be located the main entrance. More light will be admitted through a mullioned window running entirely across the front of the building above the entrance. The showroom will be 21 feet high. In the rear will be large storage rooms. The offices will be on the second and third floors. The new building will have a frontage of about 40 feet and a depth of 155.

Electric Branding Iron.

For branding hams, bacon and other packing-house products, a new electrically heated iron has been invented, which receives its current from an ordinary lamp socket at a cost of but one-fourth of a cent an hour. The heating element is a strip of resistance ribbon sealed in a head, similar to that used in electric flatirons. Around the edge are arranged the numerals which also receive the heat, and are used to mark the weight on the goods.

National Association of Electrical Inspectors.

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WILLIAM LINCOLN SMITH, Secretary and Treasurer, Concord, Mass.
R. P. STRONG, Representative on Electrical Committee of National Fire Protection Association, 809 Hibernian Bank Building, New Orleans, La.

Executive Committee
J. C. FORSYTH, Chairman, 123 William Street, New York City.

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"LET THE CODE DECIDE."

Secretary's Message.

The meetings of the New York Section, which had been discontinued during June, July and August, were resumed on Monday evening, September 13.

With exception of the months indicated, the meetings are held in the Municipal Building, on the second Monday of each month. The attendance must be considered good when the unusual spell of sultry weather which we are experiencing this month is considered. Also, many members have not yet returned from vacations.

G. E. Bruen, superintendent of the Suburban Fire Insurance Exchange, presided. The Committee on the Advisability of the Use of Copper for Fuses of over 20 Amperes Capacity reported, as did also the Committee on Outlet Boxes.

All present, however, were looking forward to discussion on the scope and application of the new city ordinance licensing electrical contractors, which goes into effect November 1.

Hubert S. Wynkoop, electrical engineer of the Department of Water Supply, Gas and Electricity, who for many years labored for the enactment of some such measure, explained fully the proposed application of the ordinance and the opportunity it places with the department to check incompetents.

Hugh Wood, inspector for the City Department, Brooklyn, and Alfred E. Braddell, of the Sprague Electric Works, brought out items of interest.

A feature of the meetings this season will be talks by well known representatives of the electrical industry on subjects of interest to electrical inspectors.

The Eastern Massachusetts Section, meetings of which were suspended during July, August and September, held its first meeting of the season at the office of the Commissioner of Wires, City Hall Annex, Boston, with 18 members present.

The subject of the meeting was the new licensing statute and its operation. This was thoroughly talked over, and it was the unanimous sentiment that the new state board organized under it was meeting the many new and difficult problems presented to it in a thoroughly satisfactory way, and all anticipated a much more satisfactory state of affairs, as a result, than has been found in years past.

The Section holds its next meeting and election of officers on November 12.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

Independent Grounding.

Question 312.—Our supply company makes a specialty of attaching a No. 4 copper wire to the neutral of its secondary system at service switch, and after bonding this to the circuit of service, direct connection is made to city water service in premises. As a contractor I grounded the armor of my installation to this No. 4 wire. Both inspector and supply company insist I must run directly to water pipe and make my own grounds. Can Code insist on this?

Answer 1(O). Fine-print note under paragraph five of Rule 28*f*, prohibits the use of the conduit ground for grounding the secondary of the transformer system. This would seem to indicate that the conduit ground and the secondary ground should be independent one of the other; in fact, an amendment to Rule 12*f*, will appear in the 1915 Code, which will call for the service conduit, if grounded, to be grounded independently of the conduit within the building. The inside conduit system should be independently grounded, so that it would be a complete and approved conduit system, even if the service wires were removed.

Answer 2(R).* Providing the ground is permanently and securely made, the Code does not specify the use of separate attachments. In this section there have been special rules formulated making it mandatory to insulate the interior conduit system from the exterior.

Answer 3(T). I cannot find wherein the Code would make an exception to the attachment of ground wire from conduit or armored cable system to ground wire from neutral of a three-wire system, provided ground wire was at least No. 4 B. & S. gauge and grounded in an approved manner.

Answer 4(P)*. No. If the company has provided a "suitable ground" (see Rule 27*c*). Owing to the possibility that the ground clamp at the water service may become defective, it is better practice to carry the armor ground wire independently to the water pipe.

Answer 5(M). The ground of the supply company is evidently the supplementary ground required other than that at the central station. I can see no objection to contractor attaching ground of conduit system to this.

Answer 6(S)*. I do not find anything in the 1913 Code that would require both ground wires carried separately to the water pipe. Rule 28*f* requires that the metal of the conduit must be grounded to water piping, gas piping or other suitable grounds. The contractor in this case has decided that the supply company's wire is a suitable ground. "The ground on the conduit system is not to be considered as a ground for a secondary system." (See fine-print note.) In the above case the order is reversed and should be approved.

Answer 7(F and G). The fine-print note at the end of Rule 28 *f* states that the ground on the conduit system is not to be considered as a ground for a secondary system. In our judgment this clearly requires a separate ground connection for each.

Answer 8(B)*. As the company supplying current installed the ground wire referred to it is justified in objecting to any party connecting or utilizing same for any purpose whatever. In so far as objections on the part of the inspector to the attaching of a wire to the ground wire of a secondary system by a contractor for the purpose of grounding a conduit or the armor of a cable installed by him are concerned, would say that while the Code does not prohibit same, and, while, theoretically, it may appear to be all right, I do not believe that inspection departments should permit contractors or others to connect to or interfere in any way with ground wires installed for the specific purpose of grounding secondary installations. If they are permitted to interfere with same in any way, it appears to me that there will thereby be a divided responsibility for the continuity and efficiency of ground wire attached to.

Answer 9(D). The rules would not prevent the use of a secondary ground as a ground wire for the conduit or cable armor.

Answer 10(U). I see no reason why you cannot ground to the No. 4 copper wire, provided it is connected to the service side of water shut-off cock.

Answer 11(N)*. A ground wire installed by a supply company is just as much its property as meter, service switch, etc. It becomes responsible for its condition, and is entirely and absolutely justified in refusing to allow any other connection to be made to it.

As to the inspector: Rule 28*f*, fine-print note, states that the conduit ground is not to be considered as a secondary ground, and if it is attached to the secondary ground wire it certainly forms a divided circuit, with the remainder of the secondary ground connection, and is technically a part of it.

Answer 12(E). The Code in its present state of wording requires but No. 6 ground wire for low-potential systems; it is, however, permissible to connect conduit and other forms of metal construction of the ground wire of the low-potential systems. The new Code, when issued, however, rules against this, suggesting two distinct grounds. Note the question states the ground is at service switch; the rule requires it ahead of the cutout, which is itself ahead of the switch.

Separate Conduits for Two Phases.

Question 313.—Does Rule 26p prevent the use of two conduits for a two-phase, four-wire circuit, the two wires of one phase being placed in the one conduit?

Answer 1(O). If the two wires of one phase of a two-phase system constitute a complete circuit these two wires may properly be placed by a separate pipe; the magnetizing effect of the current in either wire must be neutralized by a current of the same value in the other wire.

Answer 2(R)*. In this territory we ask that the installation shall be so arranged that all wires of a two-phase circuit be contained in the same conduit. These two phases are in quadrature and should be maintained in the same inclosure.

Answer 3(T). Code rule 26*p* does not prevent the use of two conduits for a two-phase, four-wire system, provided the two wires of one phase be placed in the same conduit.

Answer 4(P)*. I should rule that the two wires of one phase constitute a circuit within the meaning of the Code, and that Rule 26*p* does not prevent the use of two conduits.

Answer 5(S).* Each phase of a two-phase system should be treated as a single-phase circuit, and as such may be installed two wires in each conduit.

Answer 6(M). There is no objection to the use of two conduits for a two-phase, four-wire circuit where the wires of each phase are placed in individual conduits, provided both wires of a phase are so incased in the same conduit.

Answer 7(F and G). Rule 26*p* states that wires must for alternating current have the two or more wires of a circuit drawn in the same conduit. This is required on account of the inductive effect that is present when only one wire of a circuit is contained in a conduit. This effect is neutralized when a current flow of the same amperage travels in an opposite direction, as is the case with single-phase and direct-current circuits.

Two-phase circuits are made up of two single phases bearing a certain time relation to each other, and can properly be treated as single-phase circuits.

Answer 8(B)*. Rule 26*p* requires all wires of an alternating circuit, whether two or more, to be run in the same conduit. This would not, however, prevent two separate and distinct two-wire circuits feeding from a four-wire two-phase circuit being run in two conduits, the two wires of a phase being in the same conduit.

Answer 9(D). The rule would not prevent the use of a single conduit for each phase.

Answer 10(U). No, certainly not.

Answer 11(N)*. In this case each phase is entirely separate from the other. Each is derived from an independent armature winding, and each should be treated like a single-phase circuit, regardless of the other, though, of course, all four may be placed in the same conduit.

Answer 12(E). I have never seen this point raised before, all of my contractors being interested in the economic side of installation problems. There being no objection to having all wires of both phases in the conduit we have always found them there.

Soil Exposition.

The International Dry Farmers' Congress and Soil Exposition, which is being held in Denver, has a number of interesting exhibits illustrating how electricity is becoming every day of more importance to the farmer. There are several milking machines operated electrically. Nearly every separator in the exhibition is electrically driven, and besides these specific cases there are pumps, ditch diggers, nail machines, fire sirens, etc., all operated electrically. The exposition is illuminated thruout with type C Mazda lamps.

Wisconsin Electrical Code.

The Railroad and Industrial Commissions of Wisconsin will hold a hearing at the State Capitol in Madison on October 22, 10 a. m., with reference to standards of electrical construction and operation.

Among the Supply Men

Chicago Jobbers Stage Big Golf Party at Belmont.

Forty of the leading electrical supply jobbers of Chicago, with a number of manufacturers' representatives, braved the icy winds on Thursday, October 7, at the Belmont Country Club, Chicago, Ill. The party was arranged by N. G. Harvey, general manager of the Illinois Electric Company, and the commissary was in charge of Arthur J. Selzer, sales manager of the Central Electric Company. Despite the lowering skies and piercing winds, eight foursomes played some mighty fine golf, turning in remarkably low scores.

After a quickly eaten lunch the sturdy golfers donned their fighting togs and sallied forth. The official photographer braved the elements and lugged around a mighty press Graflex which had never been known to fail before. The golfers posed in many striking attitudes, and at the conclusion of the 18 holes gathered in the wintry blast with bared heads for a group photograph. It is sad indeed to relate that there was not light enough at any time to affect a highly sensitized film, and the picture making was the only disappointment of a splendid affair.

Willard W. Low, president of the Electric Appliance Company, who has recently recovered from an operation for appendicitis, was out for the first time, and played a great game. Despite some nasty rubs, he turned in a very creditable score, and earned the plaudits of the crowd for his game exhibition, after being so long out of condition. Low man was W. W. Smythe, Jr., who turned in an even hundred over a very difficult course. He was pressed close by Homer E. Niesz, Harry L. Grant and L. M. Joslyn. The two tyros, Thos. G. Grier and J. G. Pomeroy, working only with midiron and mashie, were not so far behind the seasoned players, and, judging by the enthusiasm with which both approached the nineteenth hole, it is a fair guess that full sets of clubs have already been ordered. The shock of the wintry winds was tempered to some degree by the heroic efforts of Harry Winder and Billy Fairclough, who administered sustenance to the rapidly fatiguing players just when relief was urgently needed. A sweepstakes aggregating $70 in cold cash was divided among eleven players. The prize winners were Messrs. Smythe, Schmidtbauer, Patton, Hoagland, Pierce, Bennett, Pomeroy, Merrill, Doherty, Low and Vogelsang.

The first four left on its round at 1:30 p. m., turning in its card at the end of 18 holes by 3:30. The last four turned in its card at 4:30 and the handicaps were made up and the prizes awarded by 4:45. This constitutes a record for a jobbers' tourney.

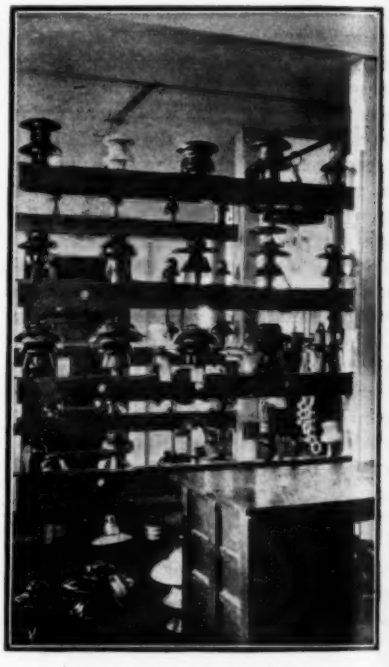
Many of the visitors were so enamored of the hospitalities tendered by the genial "Nate" that they remained over for dinner, reaching the city limits in the wee small hours of the morning after.

The party was made up of the following athletes: Walter E. Bischoff, W. N. Matthews & Bro.; C. E. Browne, American Electrical Supply Company; I. A. Bennett, I. A. Bennett Company; P. R. Boole, Electric Appliance Company; W. A. Browne, M. B. Austin & Company; W. H. Colman, General Electric Company; P. J. Cratty, Henry D. Sears Company; W. J. Doherty, W. J. Doherty Company; W. G. Fairclough, Commonwealth Edison Company; Thos. G. Grier, Thos. G. Grier Company; H. L. Grant, Western Electric Company; N. G. Harvey, Illinois Electric Company; W. G. Hoagland, Western Electric Company; M. L. Joslyn, Independent Arm & Pin Company; J. S. Jacobson, Trumbull Electric Manufacturing Company; E. B. Kittle, Sprague Electric Works; S. E. Kennedy, Central Electric Company; H. S. Lyon, Cutler-Hammer Manufacturing Company; R. G. Lane; Willard W. Low, Electric Appliance Company; A. S. Merrill, Chicago Fuse Manufacturing Company; H. F. Mac Guyer, D. & W. Fuse Company; A. L. Millard, Westinghouse Electric & Manufacturing Company; H. E. Niesz, Commonwealth Edison Company; E. K. Patton, Bryant Electric Company; F. M. Pierce, Manhattan Electrical Supply Company; J. G. Pomeroy, Warren Ripple, George Cutter Company; H. A. Selzer, Central Electric Company; J. C. Schmidtbauer, Julius Andrae & Sons Company; W. W. Smythe, Jr., Fiber Conduit Company; Fred P. Vose, John Vogelsang, Harry Winder, American Conduit & Manufacturing Company.

Effective Display of Line Material.

In a large electrical supply house an effective method of displaying line material is utilized by mounting four pairs of cross-arms underneath a stairway connecting the main showroom with the second floor, and between two passageways often traversed by customers and other visitors to the establishment.

The open space between the posts supporting the stairs affords excellent opportunity for mounting insulators and pins of different types and sizes, far enough apart to make a striking exhibit. Suspension insulators are shown hanging from rods placed at right angles to the cross-arms.



Display of Line Material.

Southwestern Association Will Meet at Galveston Again.

The twelfth annual convention of the Southwestern Electrical and Gas Association will be held at Galveston, Tex., May 17, 18, 19 and 20, 1916, the Hotel Galvez being the convention headquarters, as heretofore.

The selection of Galveston again for the convention is in response to the almost unanimous demand of the members of the association and by vote of the Executive Committee.

Public Service Commissions

Conducted by William J. Norton

INDIANA.

The **Merchants Heat and Light Company** was authorized to issue stocks and bonds aggregating $340,000, to reimburse its treasury for money expended on improvements and betterments of the company's plant during the period between March 31 and August 1.

NEW JERSEY.

The **Delaware and Atlantic Telegraph and Telephone Company** applied for approval of a franchise granted by the city of Absecon, which authorized the construction and operation of a telephone system in the city. The Board finds, however, that there is an agreement between the city and the company that in consideration of the granting of the franchise, the company is to furnish the city with certain free telephone service; and the Board concludes that, in view of the decision of the Supreme Court in **Public Service Electric Company** vs. **Board of Public Utility Commissioners and City of Plainfield** (93 Atlantic 707), it is "impelled to withhold its approval of the ordinance." In the Plainfield case, the Board ordered the electric company to fulfill the terms of its franchise which called for the rendering of free service to the city. Upon appeal, the court held in effect that such contract providing for free service to the city was discriminatory and therefore void.

NEW YORK—Second District.

The **Lockport Light, Heat & Power Company** was authorized to increase its rates on its showing that it was not earning a fair return on capital employed in the service of the public.

During the hearing, representatives of the city and the company agreed that the actual fixed capital of the company employed in the electric business was $467,435.66, not including working capital or intangibles. The Commission finds that even upon this "bare bones" valuation the shareholders could get but a little over two per cent on their investment. The Company is entitled to working capital of at least $25,000. Assuming that the company is entitled to earn seven per cent upon a valuation of $492,000, its income available for interest and dividends should be $34,435 per annum.

In regard to the present rates, the Commission said: "It appears from the record that the rates in the city of Lockport are as low or lower than in the nearby cities; in fact it must be admitted that some of the rates are much lower than the company is warranted in giving. This is particularly true of the commercial power and the wholesale power rates. It is these rates which ought properly to be advanced in order to give the company a fair return for its service. Some increases are also justified in the rates for residence and for commercial lighting."

It was estimated that the schedule fixed by the Commission would enable the company to earn an increased revenue of $41,667, "if it is able to retain all its present customers. If it loses any of them then it will not increase its earnings to that extent unless the remaining customers give the company more business or it obtains new customers to make up for those who cease to use its service."

The rates prescribed for residence lighting provide a consumer charge of 75 cents net per month per meter, and an energy charge of 5 cents net per kilowatt-hour for the first 35 kilowatt-hours per month and 2 cents per kilowatt-hour for all excess. Ten cents is added to the consumer charge if bill is not paid within ten days.

The commercial lighting rate is 10 cents per kilowatt-hour for the first 60 hours' use per month of demand, 5 cents for the next 60 hours' use, and 2 cents for all excess, subject to a minimum charge of $1.00 per month per meter. The demand is considered as 90 per cent of connected load.

For commercial power, the net rate is 7 cents per kilowatt-hour for the first 40 hours' use per month of demand, 4 cents for the next 40 hours' use and 1 cent for all excess. The minimum charge is $1.00 per horsepower per month for the first horsepower installed and 75 cents per month per horsepower in addition. The demand will be considered as 75 per cent of installed capacity if in one motor and 65 per cent if in more than one motor.

The wholesale light and power rate provides a net demand charge of $2.50 per month per kilowatt for the first 5 kilowatts of maximum demand and $1.25 per month per kilowatt for each additional kilowatt of maximum demand, and a net energy charge of 1 cent per kilowatt-hour.

A primary power rate applicable to consumers guaranteeing a use equal to 60 per cent of the maximum one-minute peak is as follows: $22 per horsepower per year for from 50 to 100 horsepower peak; $20 per horsepower per year for from 100 to 500 horsepower peak; $19 per horsepower per year for from 500 to 1,000 horsepower peak; and $18 per horsepower per year for all excess.

It is stated that the case is a notable one, in that all parties agreed as to the necessity for the increase and all the engineers agreed as to the justice of the scale worked out.

The Middleburg and Schoharie Electric Light, Heat and Power Company has been authorized to issue $20,000 six per cent first-refunding-mortgage bonds at par, under a $30,000-mortgage to the Albany Trust Company. The proceeds of the bonds are to be used to refund $9,000 outstanding first-mortgage five-per-cent bonds and to reimburse the treasury for expenditures properly chargeable to capital account between 1911 and 1914.

OREGON.

The Western Telephone Company. The Commission has approved a new schedule of rates, higher than that now in effect. The finding is, however, predicated upon the ability of the applicant to bring about the proposed consolidation with its competitor, The Favorite Telephone Company. The value of the consolidated plant, exclusive of certain duplicate equipment, was used as a basis for the new rates.

Denver Jovians Organize.

The Denver Jovian League has lately been organized, with Bert Wasley, of the Albert Sechrist Company, as president; H. S. Russell, of the Denver Gas and Electric Light Company, as vice-president, and L. D. Hammick, of the same company as secretary. Weekly meetings are held at Albany Hotel.

Electric Power Club Meeting.

The Electric Power Club will hold a meeting at the Homestead Hotel, Hot Springs, Va., on November 8, 9 and 10. The secretary is C. H. Roth, 1410 West Adams Street, Chicago.

A NEW MAXIMUM-DEMAND METER.

Monthly Meeting of the American Institute of Electrical Engineers.

The 312th meeting of the American Institute of Electrical Engineers was held at the Engineering Societies Building, New York City, on the evening of Friday, October 8. President John J. Carty occupied the chair. A paper was presented by Paul M. Lincoln, entitled "Rates and Rate-Making."

This paper pointed out the importance of the load-factor and of maximum demand in determining the cost of supplying electric service, and then described an instrument devised by the writer for measuring maximum demand. This meter depends upon the heating effect of the current and heat storage. The indications are proportional to kilowatt-hours, but the instrument may be modified so as to indicate kilovolt-amperes, thus including the effect of power-factor. Its indications depend upon the differential expansion of the liquid in two closed chambers, the difference in the heat generated in the two being proportional to the power consumed in an alternating-current circuit. The introduction of heat storage causes a lag in the indication of the meter and the quantity registered is what the author calls a logarithmic average. The design and adjustment of the meter can be varied to make this average cover any predetermined interval. The theory and the details of construction of the instrument are given. It is pointed out that this logarithmic average corresponds to the capacity of generators, cables, transformers, etc. Comparisons are made with other demand instruments and the defects of the Wright demand meter in particular are pointed out. Such meters as are satisfactory in operation are high in cost. Three appendices give the mathematical theory of the instrument.

The discussion was opened by William McClellan, who admitted the need of a satisfactory type of demand meter, but pointed out that it is not applicable to the large mass of consumers of electric service. The customer charge is the important element in residential service and this would be increased by the installation of a demand meter. It would also be difficult to explain to the ordinary consumer a rate based upon demand. Political and other reasons make its application inexpedient. Rate-making is more of a commercial than an engineering matter, and the value of service is quite as important as the cost of service.

Edward J. Cheney pointed out that it was not practical to make a schedule of rates, involving all the elements which enter into the theoretical cost of service. The consumer charge is more important than the demand cost with the average consumer, and anyhow the measured demand of residences is not the quantity that determines the cost of production, due to the diversity of this demand and to the importance of the time of use.

Philander Betts spoke of the difficulty of applying a logically correct schedule. Anything that involves an increase in the cost of meter reading, billing, etc., increases the customer cost.

John W. Lieb said that load-factor is considered in the classification of customers and does not require separate measurement for each customer, although it may be useful and desirable to have information as to maximum demand. While individuals depart from the average assumed for the entire class, such variations do not invalidate the rate schedule, which is much simplified by taking averages. If changes in residential load due to the use of household devices become necessary, a low secondary or tertiary rate will meet the requirements, without the installation of demand meters, especially since the time at which the demand occurs is more important than its maximum value.

H. G. Stott spoke in tribute to Mr. Lincoln's excellent work in developing the meter. He said that the cost of making power is a very complex quantity and illustrated its constituent elements by curves. Load-factor is an important element. The principal application of the demand meter would be to wholesale customers.

C. I. Hall described the Type H demand indicator and compared it with the instrument proposed by the author. This instrument has a straight line instead of logarithmic curve as a time element. He had tested it with different sizes of leads, which Mr. Lincoln had given as a factor affecting the Wright demand meter, and found the effect less than 1 per cent. There are special conditions under which any existing form of demand indicator will not give a good indication. He pointed out that the heating of generators, cables, transformers, etc., is dependent upon the current rather than the kilowatts and a demand meter registering in amperes is preferable for this reason.

J. B. Taylor said there are too many elements entering into a theoretically correct rate to consider them all and it is not logical to pick out the demand as the one factor to be measured. Only the demand of large customers is of any importance to the central station.

H. W. Peck said that central-station companies desire a good maximum demand meter and have use for them for about 20 per cent of their customers.

Harold Goodwin, Jr., inquired as to whether the meter could be used with direct current, since it involves a transformer.

Mr. Polokov pointed out other elements of cost in serving the customer aside from that of generating power, as the fixed charges on the local equipment, such as underground conduit, and the general overhead expenses.

Theodore I. Jones said that to get business it is necessary to have rates which customers can understand. He had 15,000 customers with monthly bills averaging less than $1.50 who are not interested in demand and whose customer charge is the largest element of cost. Diversity among such customers makes the individual demand of little importance. With big power users the element of demand is important, but of greater importance is the question of whether this demand comes at the time of peak load. The Brooklyn Edison Company secured the business of the American Manufacturing Company, twine manufacturer, only by offering it an off-peak rate. This was accepted although it involved closing the factory early during the winter months. The contract with this customer involves over a million dollars. He said that there are plenty of excellent demand meters in the larger sizes, but that he was waiting to see a good one of small size produced by the manufacturers.

Mr. Burke, of Wilmington, pointed out the use in Europe of the excess watt-hour meter, which registers separately the current taken when the demand exceeds a specified amount. Such energy is paid for at an increased rate. This arrangement has proved successful in Europe, where five different manufacturers are making such meters.

Written discussion was also presented by Alex Dow, J. G. DeRemer, F. H. Sager, E. P. Roberts, I. E. Moultrop, Frank H. Taylor, R. A. Philip, H. L. Wallau, R. A. Lindquist, Louis R. Lee and J. D. Mortimer.

In closing the discussion Mr. Lincoln said that in many cases maximum demand was of more importance and was a larger element in the cost of service than the energy consumption, and, in many cases, it would be more logical to use the demand meter even without a watt-hour meter. As regards the importance of value of service, he pointed out that this value can never be greater than the cost of supplying service by the customer himself, so that even on this basis rates must consider the elements of cost of service. He agreed that the maximum-demand meter cannot be successfully

applied to residence service. While simplification of rates is important, it is not desirable at the expense of justness and fairness. He said that while the principle of the meter was applicable to direct currents, this is not practically feasible on account of the excessive power which would be consumed in the meter itself.

At the regular monthly meeting of the Board of Directors on Friday afternoon, the secretary announced the following additional committee appointments made by President Carty since the last meeting:

Committee on Use of Electricity in Mines: Wilfred Sykes, chairman, C. W. Beers, Graham Bright, William A. Chandler, F. J. Duffy, Martin H. Gerry, Charles Legrand, Charles E. Lilley, Charles M. Means, K. A. Pauly, G. B. Rosenblatt.

Iron and Steel Industry Committee: T. E. Tynes, chairman, A. C. Dinkey, Gano Dunn, C. T. Henderson, W. O. Oschmann, K. A. Pauly, J. C. Reed, Wilfred Sykes.

Upon the recommendation of the Board of Examiners 59 applicants were elected to the grade of Associate, 27 students were ordered enrolled, two members were elected and nine associates transferred to the grade of Member.

Big Electrical Prosperity Week Meetings.

Four hundred electrical men, city officials, and others interested in Electrical Prosperity Week in the Pittsburgh district, attended a rousing get-together meeting at the Fort Pitt Hotel on Friday, October 8. It was one of the most enthusiastic of the many similar meetings which have been held throughout the country in the interests of the great nation-wide campaign.

R. S. Orr, vice-president and general manager of the Duquesne Light Company, who was to preside, was suddenly called away, and L. M. Dunn, manager of the Western Electric Company's Pittsburgh office presided.

The principal speakers of the evening were J. M. Wakeman, general manager of the Society for Electrical Development, and H. W. Alexander, director of publicity.

Other speakers were A. C. Terry, division commercial manager of the Western Union Telegraph Company, and W. A. Donkin. Mr. Terry pledged the support of his great company, stating that the 27,000 Western Union offices would gladly co-operate in the campaign by displaying the "Electra" posters in windows. The New York executive offices of the telegraph company have promised the support of the company everywhere.

Interests other than electrical are getting behind the big campaign every day. At Scranton, Pa., on Friday evening, October 8, A. J. Edgell, of the Society's Display Service Bureau, addressed the newly formed Anthracite Section of the International Association of Display Men. The first official act of this organization was to endorse Electrical Prosperity Week.

At a meeting of electrical interests in Philadelphia, on Friday evening, October 8, G. W. Hill, of the Society's staff, addressed a large audience on Electrical Prosperity Week.

The Edison Electric Illuminating Company of Brooklyn has voted an appropriation of $5,000 to advertise the house-wiring plan agreed upon by local contractors and the Edison Company. The Edison Company now takes contracts for house wiring on a flat-rate-per-room basis and sublets to the contractors. The Electrical Prosperity Week campaign plan provides that each interest, the Edison Company, the fixture companies and the contractors shall deduct 10 per cent from their regular charges on all orders placed during the week of November 29.

Empire State Meeting.

The eleventh annual meeting of the Empire State Gas and Electric Association was held in the Engineering Societies' Building on Thursday and Friday, October 7 and 8. In the absence of the president, who was detained returning from the Gas Institute meeting in California, Vice-president E. H. Palmer presided at the meeting on Thursday.

The morning session was devoted to reports of officers and committees.

The secretary read a résumé of the work of the Association during the past year, and the treasurer submitted his report showing a successful year from a financial standpoint.

On behalf of the Accounting Committee, E. C. Soobell stated that the Committee had been in conference with the statistician of the Public Service Commission, Second District, in reference to certain modifications in the accounting order of the Commission. He read a number of suggestions which are being considered and expressed a belief that changes would be made in the order which would be found by the companies to be of benefit in their accounting methods.

C. G. Durfee, chairman of the Electric Meter Committee, read a report describing new types of electric meters which had been placed on the market. In discussing his paper it was brought out that the electric companies are in a better position at the present time than ever before in reference to more scientific methods of rates, on account of improvements in the meter devices which have been effected largely through the efforts of the meter committees of the various associations.

The afternoon session started with an address by E. W. Lloyd, president of the National Electric Light Association, on co-operation between state and national associations. Mr. Lloyd called attention to many of the activities of the national association and the importance of them to individual companies in the different states.

H. B. McLean, president of the National Commercial Gas Association, followed Mr. Lloyd on the same subject and on behalf of his Association stated that they were very much in favor of some scheme of co-operation.

The secretary explained that he had asked Mr. Ramsdell, the secretary of the American Gas Institute, to invite whoever might be elected president at the meeting in California, but had not heard anything from him. Mr. Addicks, past-president of the Institute, although not speaking officially expressed himself as very strongly in favor of some method of co-operation between the various organizations to avoid duplication of effort. There was considerable discussion on this question and Mr. Lloyd and Mr. McLean stated that they would take the matter up with their directors at the earliest possible date.

The morning session on Friday was called to order by Mr. DeLong, who had arrived the night before from California.

C. A. Graves read a paper on "Method of Analyzing Cost of Service," submitting forms applicable for use in this connection for both gas and electric companies. The discussion following the reading of the paper dealt mostly with electric matters, the gas companies having apparently done comparatively little in the matter.

Luncheon was served to the members at one o'clock in the Engineers' Club, after which the meeting reconvened and listened to a paper by J. T. Hutchings on "Insurance Under the New York Workmen's Compensation Law." Mr. Hutchings stated among other things that he felt that the risk of the gas and electric business had been very much overrated. The record of the Utilities Mutual Insurance Company, composed entirely of gas and electric companies, showed losses amounting to only slightly over 16 per cent of the premium. The statistics which have been kept giving the figures of the different branches of the business were read by Mr. Hutchings and were apparently of very considerable interest to the members.

The Nominating Committee submitted its report and the following officers were regularly elected: president, J. C. DeLong; first vice-president, Stuart Wilder; second vice-president, H. M. Beugler; treasurer, C. A. Graves; secretary, C. H. B. Chapin.

Flood Lighting of Building Fronts from Ornamental Cluster Posts.

During the last few years important developments have been made in methods of lighting building exteriors. Outline lighting had been brought to an attractive point in many installations, but it was realized that it could scarcely produce an illumination of an entire building front at all comparable with the daylight effect. The advent of high-efficiency lamps giving white, steady light from a concentrated source has resulted in the development of flood lighting, of which there have been produced some notable installations with strikingly attractive effects. In order to produce an effective and reasonably economical result, this method of lighting has required special projectors for the lamps, which are built of a type resembling modified headlights.

Although not an imposing structure architecturally, the building occupies a commanding position because of its location on the island between these three busy intersecting streets.

To enhance this strategic position among competing mercantile concerns, the idea was conceived of effectively lighting the entire exterior of the building. To accomplish this economically and with a relatively small number of lamps, as compared with outline lighting, required the selection of flood lighting. Mounting of projector lamps on the opposite buildings involved many difficulties, among other things, the finding of locations for the lamps that would be free from glare. After careful study of the problem by an illuminating engineer acting in a consulting capacity to the owners, a solution was worked out whereby the top lamp reflector is mounted in the inverted position and slightly tipped toward the building as shown in Fig. 2. The lamp in the top globe is a 1,000-watt gas-filled tungsten lamp. To secure proper ventilation for the unit there are 12 one-inch holes in the lower part of the cast-iron bowl that serve as inlets. From these the cool air passes through the neck of the reflector, around the lamp and mogul receptacle, and then down along the inner surface of the glass upper bowl and out through the 36 one-half-inch outlet holes just below the middle of the globe. This ventilation has been found to be ample.

The installation consists of 17 posts spaced about 25 feet apart along the curb; 7 are along Milwaukee Avenue and 5 each along Division Street and Ashland Avenue. Each of the 4 pendent lamps on each post is a 100-watt

Fig. 1.—Day View of Installation Taken Along Milwaukee Avenue.

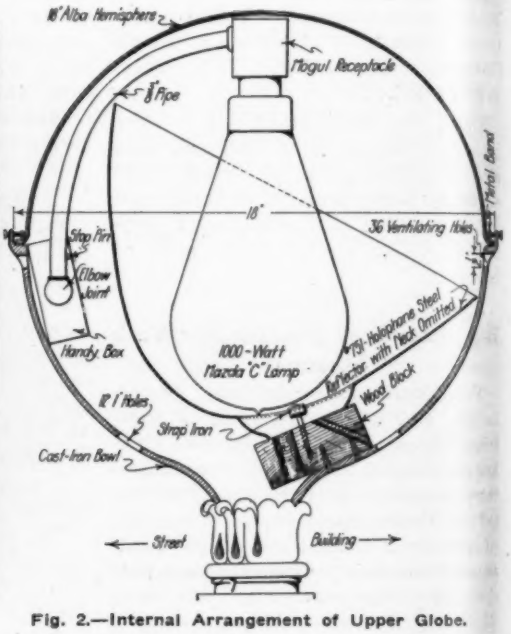


Fig. 2.—Internal Arrangement of Upper Globe.

A noteworthy departure from this practice is the installation completed a few weeks ago for a Chicago mercantile establishment. Here no elaborate projector lamps are provided, but instead of these ornamental cluster posts of standard type have been ingeniously adapted for flood-lighting service by placing a reflector in the upper globe in a comparatively inconspicuous manner which does not detract from the appearance of the post by day or night.

This installation is at the men's clothing store of Klee Brothers & Company in the northwestern part of Chicago. The building is a four-story structure, all of the ground floor and most of the upper floors of which are occupied by the clothing firm. The building is in the form of a right-angled triangle fronting on three very important thoroughfares, namely, Milwaukee Avenue, Division Street and Ashland Avenue. of the standard five-light Chicago ornamental post could be utilized as a projecting lamp. Since the specifications of these ornamental posts are defined by municipal regulations, approval was necessary for the proposed modification of the top globe.

From the day view of this installation, Fig. 1, it is seen that the appearance of the top globe was not radically altered. The new diameter is 18 inches instead of 12. Fig. 2 shows the internal arrangement. The lower part of the globe is a hemispherical cast-iron bowl; the upper part is an Alba glass diffusing hemisphere; the cast-iron globe is painted white to harmonize with the glass globe. An enameled-steel reflector of the Holophane-D'Olier angle type acts as the projecting element. This reflector was chosen on account of its distribution curve meeting the prevailing conditions when the gas-filled tungsten lamp in a nine-inch Monax glass diffusing globe. The total connected load is thus 23.8 kilowatts. The top lamps and the pendent lamps are separately controlled so as to permit independent operation, if necessary. All lamps are Buckeye Mazda lamps. Current is supplied by the Commonwealth Edison Company.

The night views, Figs. 3 and 4, give an inadequate idea of the striking effectiveness of the building illumination. Although the brightness of the white-painted wall surface is high, it is not trying to the eye and there is a complete absence of glare from the light sources. The illumination is also surprisingly uniform, considering that on the upper three stories it comes from but a small number of powerful lamps; this uniformity is due to the diffusing globes spreading the light evenly over the wall surface. From

the pendent lamps the light is of the same white color as from the large projecting units. The diffusing globes on the pendent lamps screen their bright rays and greatly reduce the tendency to glare. These lamps serve to illuminate the lower store front, sidewalk and street surface, and their effect blends very well with that of the powerful lamps in the upper globes. Although the lower part of the globes for the top lamps is opaque, this fact is scarcely noticeable. The black wavy streaks that appear on the night views are due to banners on the trolley poles that were put up for a week's carnival to boost the district.

The entire effect is very striking without being tiring to the eye. A distinctive feature is that the bright illumination of the building front does not detract from the effectiveness of the large electric signs on two corners of the building, nor from the attractiveness of the window displays. As shown in the illustrations, the entire building stands out prominently against the background of the dark sky.

Fig. 3.—Night View of Ashland Avenue and Division Street Fronts.

Fig. 4.—Night View of Division Street and Milwaukee Avenue Fronts.

The installation was designed by J. R. Cravath, illuminating engineer, Chicago. The erection and wiring was done by the Freeman-Sweet Company, electrical contractors, Chicago. The posts were supplied by the King Foundry Company, St. Joseph, Mo., through its Chicago office.

Exhibitors at New York Electrical Show.

In a year during which the great undertakings of war have held public attention, achievements of peace command, at best, only a secondary acknowledgment. Yet 1915, in spite of what is charged against it in war's destruction, has to its credit, one great commercial feat worthy a page in history.

During the campaigns of the early months of the war in Europe, engineers in America were fighting their way over mountain passes, through deserts and across streams. The spring the year saw their work accomplished; the East was connected with the West by telephone, and it became possible to talk over a distance of 3,000 miles.

At the New York Electrical Exposition, which opened on October 6, a demonstration was made of the new transcontinental telephone. Wires run direct to the Panama-Pacific Exposition, and at hourly intervals the message of the West comes east.

There are also displays which portray the work of electricity in war—an exhibit of electrical apparatus tells of accomplishments in the field of therapeutics—exhibits of domestic appliances show the home comforts that are possible through the use of current, and industrial exhibits demonstrate the great part that electricity plays in the commercial activities of this country.

Among the exhibitors of interest to the electrical trade are the follows:

Aladdin Lamp Corporation, American Telephone & Telegraph Company, Anderson Electric Car Company, Atlas Sales Agency, R. & L. Baker Company, Bell Electric Motor Company, Cooper Hewitt Electric Company, Harvey Deschere & Company, Edison Electric Illuminating Company of Brooklyn, Edison Storage Battery Company, Electric Fountain Company, The Electric Meter Corporation, Electrical Review Publishing Company, Incorporated; Electric Storage Battery Company, Electrical Testing Laboratories, Electrical Refrigerating Company, Incorporated; *Electrical World*, Federal Sign System (Electric), Frantz Premier Company, General Electric Company, General Vehicle Company, Incorporated; The Goulds Manufacturing Company, Habirshaw Wire Company, Hamilton-Beach Manufacturing Company, Wallace B. Hart, The Hoover Suction Sweeper Company, Hotpoint Electric Heating Company, Innovation Electric Company, Incorporated; Kinetic Engineering Company, Landers, Frary & Clark, Lux Manufacturing Company, Manhattan Electrical Supply Company, Metropol-

itan Electrical Products Company, Incorporated; Metropolitan Engineering Company, The Morgan Crucible Company, Limited; National Lamp Works, National Scale Company, New York & Queens Electric Light & Power Company, The New York Edison Company, New York Electric Garage Corporation, New York Electric Vehicle Association, New York Service Company, Northwestern Electrical Equipment Company, Otis Elevator Company, Phila Storage Battery Company, Pittsburgh Electric Specialties Company, Pittsburgh Transformer Company, Sangamo Electric Company, Frank Ridlon Company, Safety Insulated Cable & Wire Company, Shelton Electric Company, The United Electric Light & Power Company, Wallace Novelty Company, Incorporated; Ward Motor Vehicle Company, Western Electric Company, Westinghouse Electric & Manufacturing Company, Roger Williams, L. J. Wing Manufacturing Company, The Yonkers Electric Light & Power Company.

Exposition Engineers' Day at the Panama-Pacific International Exposition.

To commemorate the efficient work of the engineering staff of the Panama-Pacific International Exposition, a day, September 24, was set apart for public tribute to the men under whose charge came the construction of the great Exposition. The day was called Exposition Engineers' Day.

In addition to the Exposition engineers, all of whom are seen upon the left of the photograph, other notable figures in the history of the engineering work of this country were in attendance. Those shown in the group herewith, sitting, from left to right are: L. F. Laurey, assistant electrical and mechanical engineer. H. D. Dewell, chief structural engineer; Shirley Baker, chief of construction; W. O. Waters, superintendent of building construction; Guy L. Bayley, chief electrical and mechanical engineer; A. H. Markwart, assistant director of works; Harris D. H. Connock, director of works; William H. Crocker, chairman of Committee on Buildings and Grounds; Charles C. Moore, president of the Panama-Pacific International Exposition; John A. Britton, vice-president and general manager of the Pacific Gas and Electric Company, and vice-president of the Panama-Pacific International Exposition; Frederick J. V. Skiff, director in chief; John A. Brashear, president of the American Society of Mechanical Engineers; C. D. Marx, president of the American Society of Civil Engineers; J. J. Carty, president of the American Institute of Electrical Engineers; C. C. Vogelsang, commissioner of the Panama-Pacific International Exposition; F. L. Hutchinson, secretary of the American Institute of Electrical Engineers; Calvin W. Rice, secretary of the American Society of Mechanical Engineers; Clark Howell Woodward, naval aide to President Moore; Charles Warren Hunt, secretary of the American Society of Civil Engineers; Howard H. Holmes, consulting engineer and designer of the Exposition ferry slips.

Standing, from left to right: C. S. Scott, Exposition Special Events Department; Theodore Hardee, chief of the Department of Liberal Arts; Carl S. Herman, Exposition Special Events Department.

Group of Engineers and Officials at Panama-Pacific Exposition on Engineers' Day.

Electric Railway Associations Elect National Officers.

Charles L. Henry, of Indianapolis, Ind., was elected president of the American Electric Railway Association at the close of its 34th annual convention which was held at San Francisco, Cal., October 4 to 8. The affiliated organizations comprising the Claim Agents' Association, Accounting Association, Engineering Association, Transportation and Traffic Association and Electric Railway Manufacturers' Association, all held their annual meetings at the same time. On behalf of Governor Hiram W. Johnson, Chester C. Rowell welcomed the delegates to the electric railway convention. A splendid array of reports and papers were presented at the business sessions, and the visitors participated in a series of elaborate entertainments.

The following officers were elected:

American Association: President, Charles L. Henry, Indianapolis; first vice-president, L. S. Storrs, New Haven, Conn.; second vice-president, Timothy S. Williams, Brooklyn, N. Y.; third vice-president, John J. Stanley, Cleveland, O.; fourth vice-president, John H. Pardee, New York, N. Y.

Accountants' Association: President, T. P. Kilfoyle, auditor, Cleveland Railway Company, Cleveland, O.; first vice-president, L. T. Hixson, auditor, Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.; second vice-president, H. A. Culloden, secretary and auditor, Pacific Electric Railway Company, Los Angeles, Cal.; third vice-president, George G. Whitney, Washington Railway & Electric Company, Washington, D. C.; secretary, M. R. Boylan, general auditor, Public Service Railway Company, Newark, N. J.

Claim Agents' Association: President, George Carson, Seattle, Wash.; first vice-president, R. E. McDougall, Rochester, N. Y.; second vice-president, S. B. Hare, Altoona, Pa.; third vice-president, B. F. Boynton, Portland,

Ore.; secretary-treasurer, B. B. Davis, Columbus, O.

Engineering Association: President, John Lindall, Boston, Mass.; first vice-president, F. R. Phillips, Pittsburgh, Pa.; second vice-president, G. W. Palmer, Jr., Boston, Mass.; third vice-president, W. G. Gove, Brooklyn, N. Y.

Transportation and Traffic Association: President H. A. Nicholl, Anderson, Ind.; first vice-president, L. C. Bradley, Houston, Texas; second vice-president, R. E. Danforth, Newark, N. J.; third vice-president, W. H. Collins, Gloversville, N. Y.

Manufacturers' Association: President, Thomas Finigan, San Francisco, Cal.; vice-president in charge of relations, Charles C. Peirce, Boston, Mass.; vice-president in charge of finance, L. E. Gould, Chicago, Ill.; vice-president in charge of exhibits, Daniel W. Smith, Detroit, Mich.; vice-president in charge of entertainment, E. F. Wickwire, Mansfield, O.; secretary-treasurer, H. G. McConnaughy, New York, N. Y.

The officers of the affiliated associations, with the exception of the Manufacturers' Association, are members of the Executive Committee of the American Electric Railway Association.

Chemical Engineers to Meet in Baltimore.

The winter meeting of the American Institute of Chemical Engineers will be held in Baltimore, Md., January 12 to 15, 1916. A number of papers on recent and important developments in the chemical industry are being arranged. The secretary is J. C. Olsen, Cooper Union, New York City.

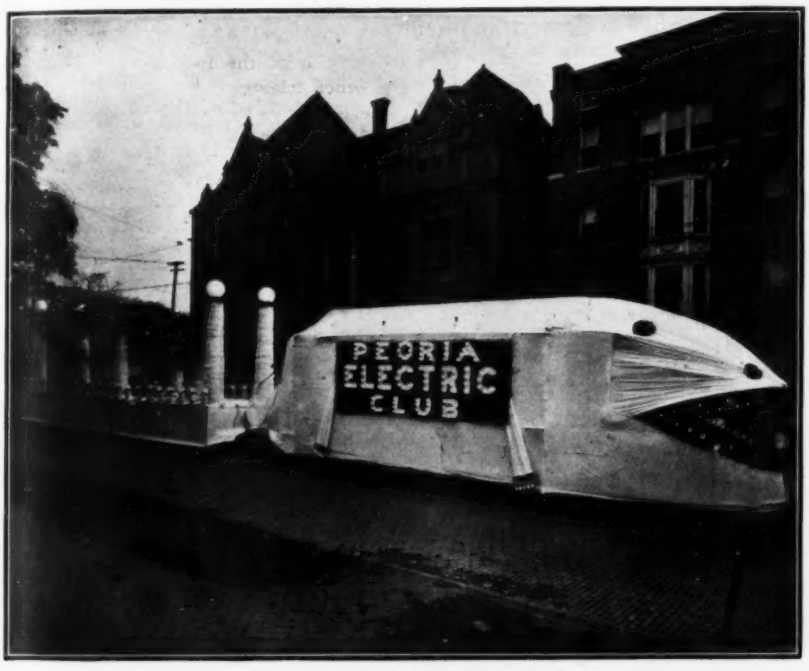
Peoria Club Wins Prize.

The illustration shows the float of the Peoria Electric Club which took first prize in the Civic Parade in Peoria, Ill., on the evening of October 4.

Instead of each of the electric companies making a float, the club entered the float as a joint effort. All work was done by members of the club, who donated their services. The idea was a dragon drawing a float in which was seated "Electra."

The total length of the float was 60 feet. The dragon was built over a work car belonging to the railway company. The mouth of the dragon was lined with red lamps. The sign on each side was made from white lamps backed with a pale green paper.

The photograph was taken late in the afternoon and does not show the float to as good advantage as it appeared after nightfall. The four pillars each had an electric light on them and the pergola was covered with flowers, growing out of a large flower pot in front, and a bunch of roses. In each rose was an electric light. In all 600 lamps were used to illuminate the float.



Float of Peoria Electric Club.

This parade was given as an added attraction to the visitors to the Implement Fair and was a huge success. Over 683 vehicles and 250 floats were in the parade, including 17 floral floats. The parade was seven miles long and took over three hours to pass. Electricity was used to illumine several other floats and there were no storage batteries to be had that day.

The lighting company and the street-railway company co-operated with the contractors to make the float a success, and the winning of first prize was no small thing in view of so many floats being entered.

The Electric Club has put itself in public view and all who saw the parade will remember the club. This is another way of helping the electric business along towards Prosperity Week.

Municipal Electric Power System of Sydney, Australia.

As might be expected in a city of almost 800,000 inhabitants, electrical power is available in Sydney to consumers throughout the municipal area. The city council and not a private company controls the power plant, the chief electrical engineer being H. B. Forbes Mackay, who combines with his duties as electrical engineer the administration of the power-sales department. The total capacity of the plant in kilowatts is 15,000 alternating current and 15,000 direct current. The alternating current is of 50 cycles frequency and three-phase supply is ordinarily used for motors. The voltage customarily used for motors is 240 for either alternating or direct current.

The municipal council is not engaged in the importation and sale of motors to consumers, this business being exclusively in the hands of regularly established commercial houses, some of which carry fairly extensive stocks and others import on indent only. Australia being a British dependency, British makes of electric motors are in firm request, but there would appear to be a fairly good field for American wares if the interested manufacturers were prepared to wait some time for results.

It is safe to estimate the number of local manufacturing plants that use electric power at over 400, with a power consumption of about 2,500 kilowatts. There are no industrial plants generating their own electrical power in the city. Although not primarily a manufacturing community, recent years have witnessed considerable development in this direction, and there are now in operation numerous relatively small factories for the production of ordinary necessities. Machine shops of the local shipyards and government-owned railways are well equipped, and offer an attractive field for investigation by the American manufacturer of electrical lines.

Electrically illuminated street signs of novel design are being tried out in San Francisco. The sign is made of heavy glass lenses set in a massive iron case, which is set flush with the curbstone. Within the case are a number of incandescent lamps that are switched on at nightfall. The lettering shows distinctly by day and even more conspicuously at night.

New Electrical and Mechanical Appliances

Lamp Grips on Bryant Sockets.

Considerable trouble and inconvenience has been experienced in lamps loosening in sockets when installed where subject to vibration. This is particularly true in factories using high-candlepower lamps where heavy machinery is operated, and on steam and electric cars, steamboats, etc. Constant jarring and vibration cause lamps to unscrew or "back off" from the base contact so that the circuit is broken and often the lamp falls.

To overcome this difficulty, the Bryant Electric Company, Bridgeport, Conn., has developed a new and very effective lamp grip. In this new form of socket, the threaded copper portion which receives the lamp is slotted on two diametrically opposite sides in such a manner as to provide two tongues which are flexible. Two flat steel springs are mounted in the porcelain base with the free ends so arranged as to bear on the outside of these copper tongues. This will be clearly understood from the accompanying illustration. Thus, without any external adjustment or any other labor than the insertion of the lamp, sufficient tension is brought to bear upon the lamp base to prevent vibration from causing the contact to break, even under the most severe conditions with violent and continued jarring.

Bryant Socket Provided with Lamp-Grip Feature.

This lamp-grip feature can be supplied at a slight additional charge, in connection with practically all sockets of both the medium and mogul type manufactured by the above-named company.

New Assembled Porcelain Knobs.

In all wiring work involving the use of porcelain knobs, much time is usually lost in gathering the batch of parts needed for the knobs and in assembling the knobs at the job. For instance, say 75 knobs are needed; the stockkeeper will count out 75 caps and 75 bases from one bin, 80 nails from another bin, and 80 leatherheads from a third bin; usually all these parts are then dumped into a box and taken to the job, where the helper, or the wireman himself, must assemble the knobs ready for use. Much breakage and loss of loose parts also results from this common practice.

A new type of knob recently placed on the market eliminates these difficulties by a simple construction which insures that the knobs are always handled as a complete assembled unit ready for instant use. The base, cap, leatherhead, and nail are assembled once for all at the factory and remain in proper relation at all times. The cap is extra strong to minimize the liability to breakage.

"Nail-It" and "Screw-It" Assembled Porcelain Knobs.

Two forms of these new knobs are made, as shown in the accompanying cuts. The screw type possesses the same features as the nail type. The cap is countersunk to exactly fit the screw supplied. Loss of parts of the knob, nails or screws is eliminated and a vast amount of time saved by having the assembled knobs ready for use.

These knobs are known, respectively, as "Nail-It" and "Screw-It." They are manufactured by J. H. Parker & Son, Parkersburg, W. Va., and sold through the leading jobbers throughout the country.

New Telautograph Invented in Sweden.

United States Consul General Ernest L. Harris, of Stockholm, Sweden, states that a new telautograph or telewriter, an instrument for telegraphic transmission of ordinary handwriting, has just been invented by two Swedish engineers. This new apparatus apparently differs entirely from the fundamental principles of other telautographs. The most characteristic feature of the apparatus seems to be that it can be used independently of the electrical resistance of the line. It can be connected alternately to a long or short line without any adjustment of the resistance, and can consequently be used in connection with the public telephone systems. This apparatus has been in practical use for some time for testing purposes, and its manufacture for commercial exploitation has now been started in Sweden.

Turbine Operates 32 Months Without a Stop.

A remarkable record of continuity of service in power-plant operation has just been reported by the Quincy Market, Cold Storage & Warehouse Company, Boston, Mass. Mr. Fairbanks, the chief engineer of this company, reports that it has had in operation a 500-kilowatt Westinghouse-Parsons steam turbine which has been carrying load continuously for two years and eight months without the steam being turned off at the throttle. A short time ago it was decided to shut down the turbine to give it an inspection. This inspection showed that the machine was in perfect condition, and it was immediately started up and put back into service.

In an up-to-date refrigerating plant, such as this one, continuity of service is absolutely essential, as any interruption in service means considerable financial loss, and the record shown above is evidence of the reliability of modern generating apparatus.

In the first half of 1915, 18 electric locomotives, valued at $134,238, were exported from the United States.

Improved Disconnecting Switches and Busbar Supports for Large Generating Plants.

Delays and outages due to short-circuits and switching mistakes have ever been serious, but with increasing sizes in generating units, the significance of better equipment in switches and busbar supports is very apparent to anyone. We now have units of 20,000, 25,000, 30,000 and 35,000 kilowatts, and with 50,000-kilowatt units already designed and being called for by some of the big companies, the bus and switch detail to care for these big units has not progressed with the demand. Consequently, certain large plants have suffered serious losses due to failure of bus supports and their attendant structures and compartments; disconnecting switches have also been opened by shorts and other causes. To provide more reliable and safe devices for these conditions, the engineers have first called for heavier and more rugged bus supports with greater factor of safety, and then called for a locking type of disconnecting switch, followed with a demand that the locks must be positive, and then with further demands that the locks must be foolproof and interferenceproof.

Fig. 1.—6,000-Ampere Switch.

Engineers are today demanding better switches with guaranteed minimum millivolt drop under full load, fixed frequency and temperature; such switches can only be manufactured with special care and materials. The use of solid copper forgings has made possible great savings in energy formerly lost through use of poor design and cast copper parts in switch construction. Another waste in energy is found in the various clamp devices that are used on the buses, supporting cables, etc. The elimination of this waste can be obtained by the use of nonmagnetic materials in the construction of the clamping member or the supporting device of the conductors.

Phosphor-bronze bolts, when machined from the solid rod, have great strength and are superior to brass or other metals. The porcelain factor is one often neglected by the designing engineer, primarily owing to a multitude of other details seemingly of more importance. It is not generally realized that the entire system is dependent upon the insulating properties and strength of the station porcelain, whether this be on switches or on bus supports. Porcelain manufactured by the wet process has greater strength than that of any other process and is, therefore, used exclusively for all classes of important devices and fittings. Such porcelain can be equipped with well-cushioned mechanical clamps for the proper support of its hardware. The use of cement in any form should be avoided. The design should permit a test with combined high frequency

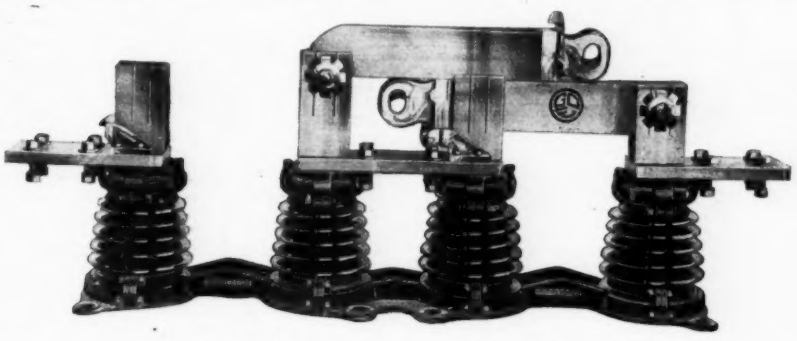


Fig. 3.—Special Switch for 30,000-Kilowatt Generator.

Fig. 2.—Side View of Same 6,000-Ampere Switch.

Fig. 4.—2,000-Ampere, 15,000-Volt Bus Switch.

Fig. 5.—Another Type of 2,000-Ampere, 15,000-Volt Switch.

and high potential of, say, four to seven and one-half times greater than the service voltage, and on high-capacity service due allowance must be made for "spill-over" troubles. This usually requires very heavy and rugged porcelain.

The General Devices & Fittings Company, Chicago, Ill., has recently furnished much switch and bus-support equipment for three of the largest power plants in the country, and descriptions and illustrations of a few of these new designs are given here for the first time.

Referring to Figs. 1 and 2, these show a front and side view of a back-connected positive-lock type switch with a rating (on the conservative basis of 680 amperes per square inch of cross-sectional area and of 68 amperes per square inch of contact area) of 6,000 amperes and 600 volts, 60 cycles, and 20 degrees Fahrenheit limit temperature rise. These are the only switches ever provided with a positive lock which is thrown in or out with the switch handle. The studs are milled from solid copper forgings and slotted seven inches deep for bus insertions. The studs can also be slotted for vertical buses. All contacts are ground to reduce the millivolt drop to the lowest possible point. All hardware, bolts, nuts, spring washers, etc., are of phosphor bronze, turned from solid rod. The clips are of Sigamond spring copper; the blades are extra-hard-drawn pure blading copper; the handle fork and entire lock are of Hertz nonmagnetic metal; and the handle itself is of black fiber made from rings turned to size and treated. This switch is made in sizes up to 16,000 amperes; above 10,000 amperes all sizes are equipped with double-cushion locks and interferences.

Fig. 3 shows a special generator switch for a 30,000-kilowatt, 13,200-volt turbogenerator. It is equipped with positive locks and throw-over interference. The patent base is continuous.

In Fig. 4 is shown a special generator bus switch rated at 2,000 amperes and 15,000 volts, and mounted on a patented malleable-iron bridge base. The positive type lock is especially heavy and very rugged. The clip block is a single-piece copper forging, with slots six inches deep.

Fig. 5 shows a special extra-heavy switch for 2,000 amperes and 15,000 volts equipped with positive snap lock and vertical terminals for bus insertion. The patent bridge base is an assurance of continuous alinement. The clip blocks are one-piece solid copper forgings milled and slotted to micrometer size. Any switch can be arranged, if necessary, for mounting upon pipe frames, either single or double pipe, and on the horizontal or vertical plane for front-connected switches and horizontal only, if the switches are back-connected.

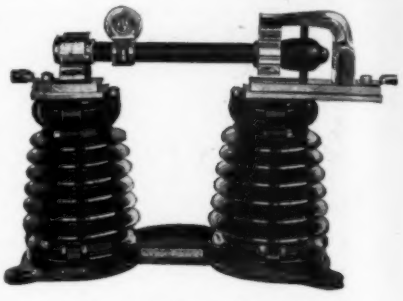


Fig. 7.—Support for 15,000-Volt Fuse.

Fig. 6 shows a triple-pole locking-type switch equipment mounted upon a horizontal pipe frame. These switches are rated at 2,000 amperes and 600 volts, 60 cycles. They are equipped with positive interference locks and are the

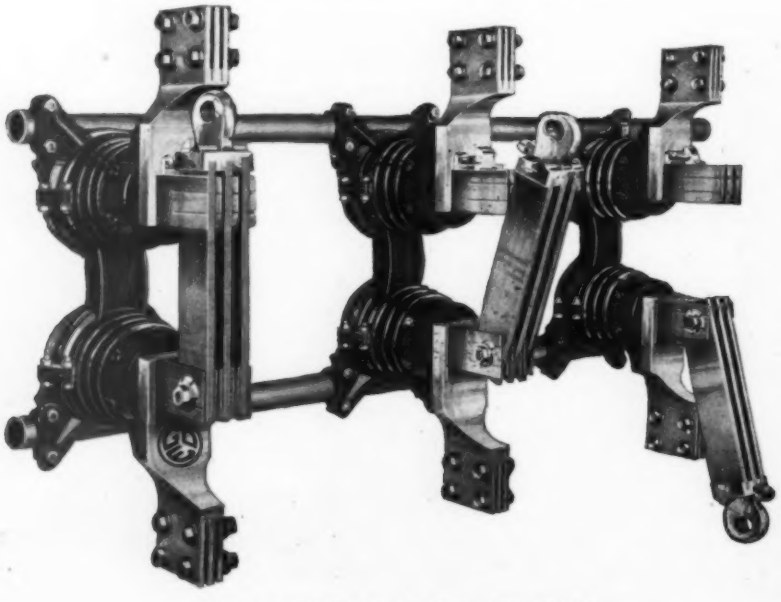


Fig. 6.—Triple-Pole Locking-Type Switch.

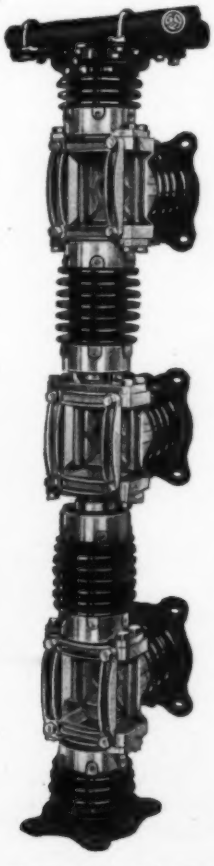


Fig. 8.—Three-Phase Bus Support.

Fig. 9.—15,000-Volt Clamp-Type Bus Support.

first of their kind to be made. The bridge bases permit of vertical adjustment, and barriers are provided between switches, but are not shown on the cut.

In Fig. 7 is shown a disconnect-type support for a 15,000-volt expulsion fuse. These are also built for cartridge-type fuses and are also mounted on bridge bases. They are furnished for both flat and pipe mounting.

A special three-phase bus support for 600-volt service is shown in Fig. 8. All metal, except in the bases, is Hertz nonmagnetic metal; the bolts are phosphor bronze machined from solid rod. These supports are now made in all sizes and voltages and to support up to 19 bars one-fourth inch by ten inches, which, so far as known, is the largest support ever made of this type. Any combination of mounting can be arranged for. This support is also adjustable. Its weight is 320 pounds.

Fig. 10.—Tubular-Bus Support.

Fig. 9 shows a 15,000-volt special extra-heavy clamp-type bus support for holding heavy vertical buses and arranged to be mounted in and between a 36-inch compartment.

Fig. 10 is also special and extra heavy. It is arranged for 3.5-inch copper tubing insulated for 13,200 volts. It is adjustable all around, and can be removed from the bus while power is on bus.

Fig. 11 shows a single support to take one phase leg from the big support shown in Fig. 7. It is arranged for mounting on two parallel pipes and

Fig. 11.—Bus Support for Pipe Mounting.

is built to clamp the bus and not for contact or taps.

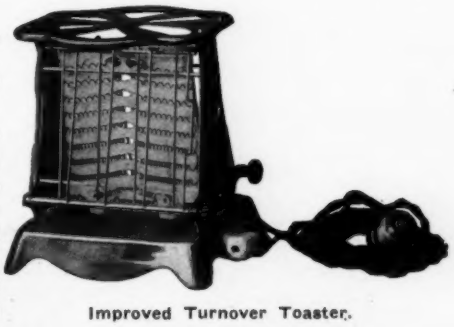
Fig. 12 shows a heavy contact-type bus support for 15,000-volt service. This support is adjustable all around. All porcelain is tested with high frequency at 220 to 280,000 cycles and is also given a combined high-potential, 60-cycle, and high-frequency test of 275,000 cycles before shipping, and this test is with all hardware and equipment in place. All shipments are packed in cartons, each unit being entirely complete.

The General Devices & Fittings Company was the first manufacturer to build switches with a guaranteed millivolt drop, and on both the heavy-capacity and the central-station standards. Copper forgings are used entirely for all switch work and terminals. The porcelain used is said to have no equal for design or strength, and is guaranteed to be wet-process entirely. Corrugated-post types for voltages up to 66,000 volts are stocked. Floor and wall tubes and bushings are also stocked up to 35,000 volts and can be furnished up to 150,000 volts. The company's exhibit of porcelain is the largest in the country outside of an insulator factory. Its trade-mark "G. D. F." means "Good Designs First" and, taken with its slogan of "Quality and Service," is surely exemplified by the illustrations that are shown with this article.

Fig. 12.—Special 15,000-Volt Bus Support.

Toaster That Turns the Toast.

A recent addition to the line of electric ware marketed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is the "turnover" toaster. The appearance of this device is shown in the accompanying illustration. By turning the knob near the bottom the frame is thrown outward, while wire catches at the bottom trip the toast outward so that it slides along the frame with the



Improved Turnover Toaster.

browned side down. On turning the knob back again the toast is raised to a vertical position with the fresh side toward the heater.

The heating element consists of a continuous coil of resistance wire wound on a porcelain plate. The resistance is so distributed as to produce uniform heating, taking into account the variation in heating effect caused by the vertical position of the heater. The entire device is nickel-plated and highly polished, and has a shelf for warming plates or keeping the toast or the coffee hot.

Cutler-Hammer Charging Panels.

For garage work it has been a practice in the past in the case of any considerable size equipment, say from six circuits up, to use slate panels mounting at the top an ammeter and voltmeter and below the meter in succession six double-pole double-throw knife switches and fuses, it being the idea to throw the double-pole switch, to the hinges of which is connected the

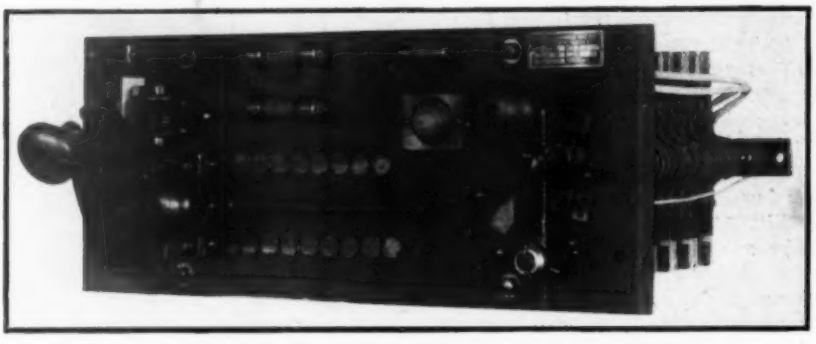


Fig. 1.—Near View of Standard Unit of Book-Case-Type Charging Panels.

battery, to one side to connect the ammeter into circuit and to reverse the throw to cut the meter out of circuit; voltmeter readings on each battery being taken by some sort of a push button, or in some cases by a six-circuit voltmeter switch mounted at the top of the panel.

The charging rheostats are generally mounted above the slate panels, the levers on the switch heads protruding through the rheostat case, and being manipulated by means of some sort of a rod with a ring on the end of it.

The chief objection to this type of apparatus is that there is quite an arc drawn at the moment of transition from meter reading to non-reading position of the knife switches. In other words, in throwing from the meter circuit to the line circuit there is always an arc drawn, which is, of course, very destructive to the switch blade and contacts, and in the case of Edison batteries charging at extremely high currents there is also the danger of the operator's hands being burned.

Fig. 1 shows a single section of the new Cutler-Hammer book-case type of panel. The slate itself is obtained from the Monson Maine quarries, being the best that can be used for electrical purposes. On each slate section is mounted a low-current circuit-breaker, a slider type of rheostat, one pair of battery fuses, a pilot light, light fuse and a meter-reading switch.

The low-current circuit-breaker is pivoted at the bottom, and cannot be closed unless the slider cross-head is at the extreme left-hand side of the panel. In other words, it is mechanically interlocked with the slider cross-head, thereby preventing the operator from throwing the battery on the line with the resistance all cut out. The circuit-breaker is held closed by means of the pivoted armature engaging the pin clearly shown at the top of the circuit-breaker, the holding magnet itself passing the full or series current. The circuit-breaker in this side has a holding range of approximately eight to one, that is to say, if the series coil is designed for 60 amperes the breaker will hold closed down to approximately 7.5 amperes. The slider cross-head acts simply as a means of bridging from the upper to the lower set of buttons, the resistance being connected from button to button contacts on the upper and lower rows.

It is apparent, therefore, that the carrier arm does not carry current, the current being taken from one copper shoe to the other one by means of double pig tails. There is also some current carried across by means of the heavy bronze flat springs on the under side of the cross-head.

The pilot light is connected directly across the battery terminals, and lights up whenever a battery is connected to that particular section. The meter-reading switch on the extreme right has three positions, one of them the normal, that is the position as shown on the photograph, which allows the current to flow from the bottom track through the laminated copper brush on the under part of the switch lever to the small segment clearly shown at the top. This segment is connected to one side of the line. The meter reading position is obtained by moving the switch lever to the right as far as it will go and against the tension of a spring. This allows the main current to flow from the lower track to the small segment to the right at the top, connecting in the ammeter, and at the same time the two small contact springs under the right-hand stop post are short-circuited by a brass strap carried on an insulating fiber support on the lever, so as to complete the voltmeter circuit to the battery. It is evident, therefore, that ammeter and voltmeter are read simultaneously, and that upon letting go of the handle on the switch lever it will return to its normal position, that is the position with the meters both out of circuit, without drawing an arc, for the simple reason that in the process of transferring from the meter to the non-meter position the meter itself is simply short-circuited and then cut out of circuit.

There is one other position for this meter switch to assume and that is the one obtained by moving it over against the left-hand stop post, in which case the line circuit itself is opened, but there is no burning of the contacts or the brushes, as the arc is drawn on a blow-out roller and copper pencil held by a spring in contact with the roller. This spring is clearly shown on the top of the lever. To prevent burning of the contact roller a powerful magnetic blow out is provided, the magnet itself being mounted on the rear of the panel, the windings being designed to pass full series current.

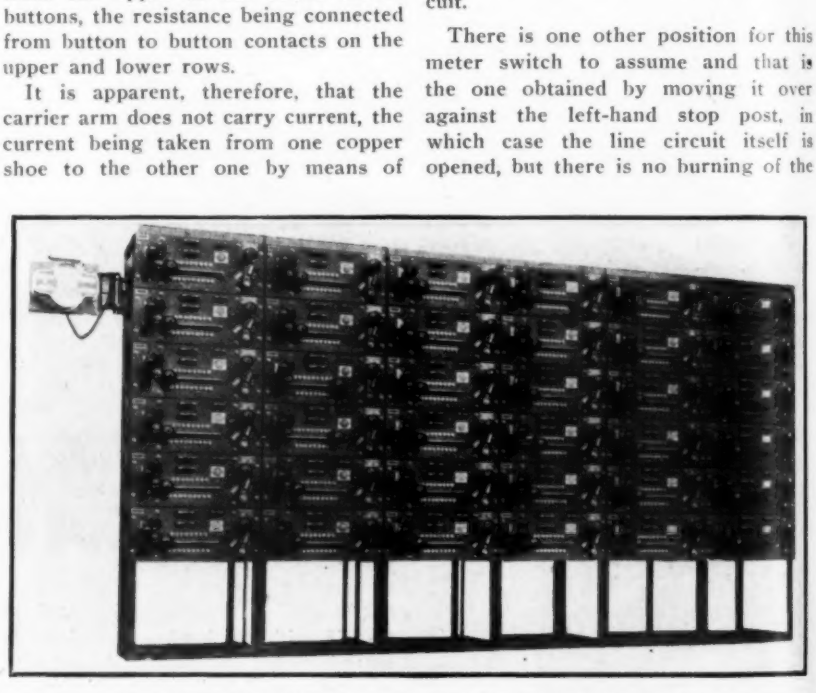


Fig. 2.—Battery-Charging Board with 36 Standard Units.

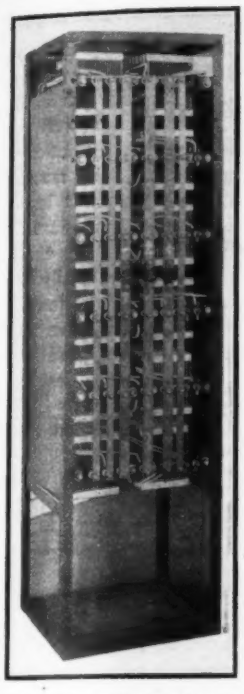


Fig. 3.—Rear View of Six-Section Panel.

of equipment it is only necessary to remove four bolts from the slate and two from the steel strap holding the

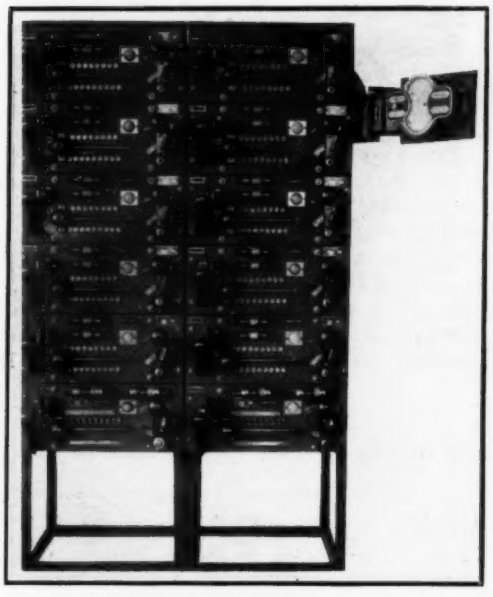


Fig. 4.—Board with Ten Standard and Two Special Sections.

rear ends of the grids, to entirely remove it from the frame, just the same as one would pull a drawer out of a cabinet.

Fig. 2 shows an equipment made up of thirty-six of these standard sections, each section being designed to charge 42 lead cells at 40 to 8 amperes from a line voltage of 115.

From this view it will be noted that whereas in the existing old-style type of equipments each six-circuit panel requires an ammeter and voltmeter, thus introducing an item of considerable expense, with this new sectional type of equipment one duplex meter can be made to suffice for 36 circuits, or in the case of the meter shown on the panel where it is illuminated it probably could handle 42 circuits, it simply being a matter of distance, at which the meter scale is easily read.

Fig. 4 shows a 12-circuit equipment arranged for three-wire service. The two lower sections, however, are of larger capacity, the rating being 180 amperes. From the construction of the two different capacity sections it will be seen that the only difference is in

If this meter switch is moved to this open-circuit position, circuit to the battery, of course, is opened and the low-current circuit-breaker automatically opens, and since the circuit-breaker is connected into one side of the line, the meter switch into the other, double-pole protection is provided without the necessity of a knife switch.

The resistance grids are carried by a strap iron on one end, and on the other end by a steel crab, which is fastened in turn to the rear of the slate panel.

Each section is completely wired and assembled before being mounted in the frame.

With the particular size of front shown in the illustration, 16 steps of adjustment are usually provided, the capacity of the front itself being 90 amperes.

With this sectional or book-case type

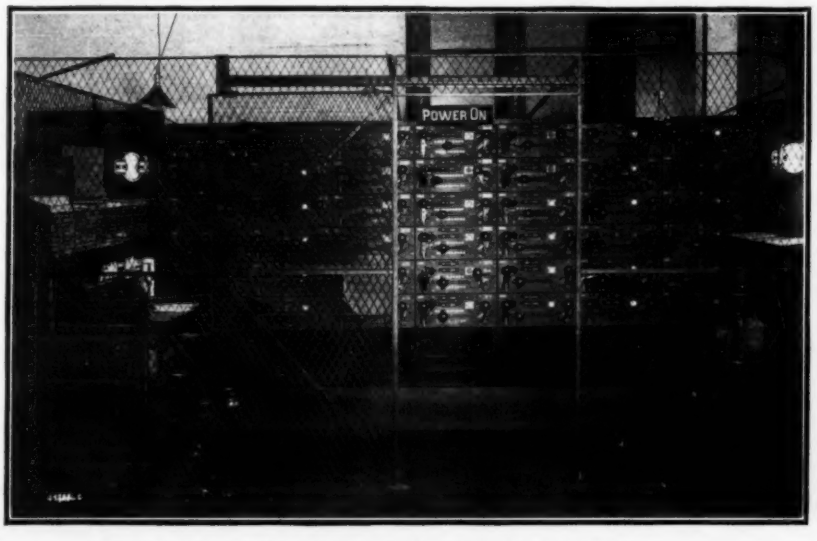


Fig. 5.—41-Section Charging Board in Service.

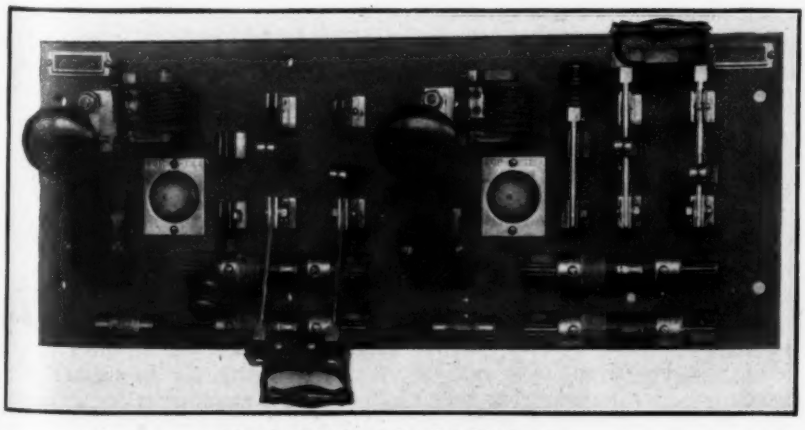


Fig. 6.—Detail of Special Section.

the contacts, the 90-ampere being of the double-button type and the 180-ampere of the double-copper-segment type. The slate panels, however, are both the same size, the grid supports being identical in construction. They therefore fit into the same frame, and the high-capacity section can be interchanged with a lower-capacity section and vice versa.

Fig. 5 shows a 41-circuit equipment which is of particular interest.

Each charging section is standard in construction, as shown in Fig. 1, with this exception, that on the tail of the low-current circuit-breaker there is fastened a silver-tipped bronze spring

that makes contact with a spring post when the circuit-breaker is open.

By referring to the illustration note should be made that on the upper slate section on the extreme left-hand panel there are mounted two Schwarze high-tension bells designed to operate on 115-volt circuit.

If for any reason when a battery is on charge the line voltage should fail entirely or fall below that of the battery so as to cause the current to reverse in the circuit, the circuit-breaker will drop out and, through the contact springs just mentioned, complete the circuit to the bell, calling the attention of the operator to the fact that the breaker is open. This particular equipment was built for a contractor in New York, engaged in hauling United States mail.

Fig. 6 shows the detail section of a 90-section equipment recently installed. Each slate section mounts two low-current circuit-breakers and pilot lights as used on the standard sections, also two special double-pole single-throw knife switches with patented meter-reading clips. There are also furnished two single-pole single-throw resistance-shorting switches. The operation is as follows: When the battery has been plugged on to the panel, the double-pole switch is closed so that it engages the two meter-reading clips nearest to the switch hinge, the single-pole switch being opened. The open-circuit voltage, therefore, is recorded on the voltmeter; now by closing the circuit-breaker and closing the knife switch in a little further so that it makes contact not only with the two meter-reading clips, but also with one of the switch posts, one of which is higher than the other, the closed-circuit counter voltage of the battery is recorded as well as the charging current flowing through the battery. Closing the switch all the way allows the switch blades to slip pass the meter clips cutting the ammeter and voltmeter out of circuit without causing an arc. In other words, this knife switch functions exactly the same as the standard meter switch previously described.

New Compensator Type Relay.

A new type of circuit-opening, inverse-time-limit, oil-dashpot relay has recently been developed by the General Electric Company for use in conjunction with a low-voltage release for automatic overload and low-voltage protection of alternating-current motors up to 2,500 volts and 300 amperes.

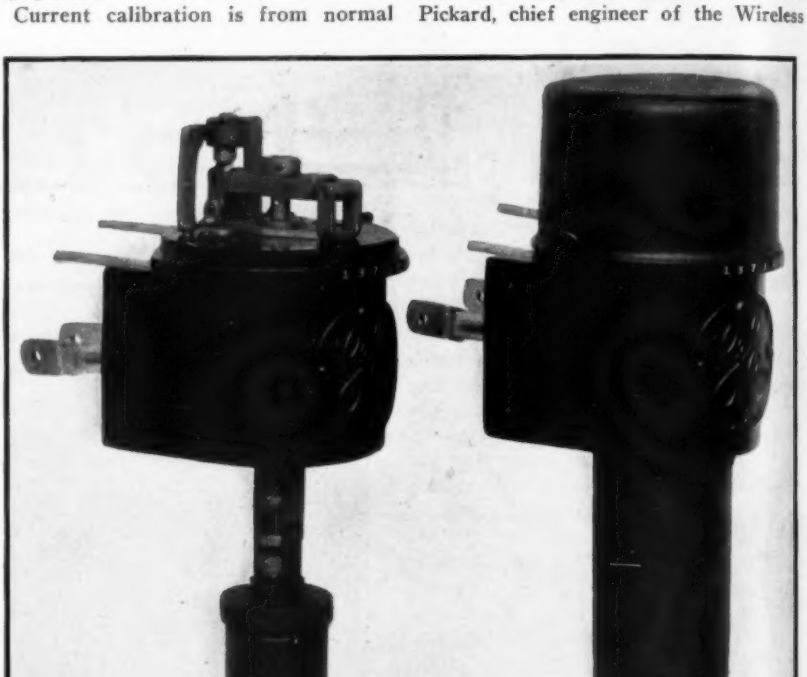
The relay is connected in series with the line, the low-voltage release across one phase in the usual manner with the low-voltage coil in series with the relay contacts.

On overload greater than the current setting of the relay, the relay contacts open-circuit the low-voltage release coil and the motor is cut out of circuit. If the voltage drops to a predetermined per cent of normal, the motor is also disconnected from the power supply.

This relay is mostly employed with motors using self-contained compensator control, but sometimes for switchboard service when both low-voltage and time-delay overload protection are required. Here series relays replace the secondary relays, current transformers and oil-switch tripping coils otherwise required, this simplifying and reducing the cost of the equipment.

Current calibration is from normal to twice normal, and time adjustment from ten seconds to five minutes on 25-per-cent overload. The delay recommended, however, is about 15 seconds at the starting current of the motor. This affords ample protection to the motor against damage from overload or single-phase operation, but prevents the circuit from being opened while the motor is starting.

The new relay is a vast improvement over the one previously manufactured. The contact, dashpot and calibrating tube are inclosed by dustproof stamped-steel covers. Current and time adjustment are accomplished outside of the dashpot simply with the aid of a screw-driver. The settings are constant, for an adjusting nut is locked in place after each setting is made.



Series Relay, Showing Device Open and with Covers in Place.

Wireless Companies Use Bakelite.

For a considerable period, the manufacturers of wireless apparatus experienced difficulty in the matter of insulation. Fiber and hard rubber were not at all satisfactory, for the insulation in addition to having the requisite mechanical and dielectric strength, must be impervious to moisture, oils, and dust. It must be absolutely unaffected by change in temperature. This is especially true in the tropics where the high humidity and extremes of temperature have rendered fibers and hard rubber unsatisfactory. These insulation difficulties were solved by the Wireless Specialty Apparatus Company at the suggestion of P. K. Reynolds.

In discussing this matter with G. W. Pickard, chief engineer of the Wireless Specialty Apparatus Company, Mr. Reynolds suggested Bakelite, knowing that it had the desired characteristics. Acting upon this suggestion Mr. Pickard obtained from the Continental Fiber Company, which is a licensee of the General Bakelite Company, samples of Bakelite Dielecto in sheet form. These samples proved so satisfactory that this substance was adopted for use on all parts of wireless apparatus made by the Wireless Specialty Apparatus Company.

About the time Bakelite Dielecto was adopted by this company, it was at work upon a wirelsss set for the United States Navy Department. After testing it, the Navy Department was so much pleased that it adopted it for use in the United States Government wireless apparatus. Since that time, other wireless companies have come to use Bakelite.

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

AUTOMATIC PHONOGRAPH. — The Automatic Machine and Tool Company, 210 North Ann Street, Chicago, Ill.

Gabel's Automatic Entertainer, consisting of a special phonograph with automatic mechanism for changing records and needles, all inclosed in a wood and glass case. A coin-switch controls circuit of one-twentieth horsepower, 110 or 220-volt, alternating-current or direct-current motor, which winds phonograph spring. An incandescent lamp illuminates device while operating.

Listed September 3, 1915.

CABINETS.—United Electric Manufacturing Company, 926 Lafayette Street, New Orleans, La.

Cast-iron boxes designed for use especially in concrete walls as inclosures for cutouts, and as junction boxes.

Listed August 2, 1915.

ELECTRICALLY LIGHTED SCALE.—Detroit Scale Company, Detroit, Mich.

A computing scale provided with an attachment plug and cord and six small incandescent lamps which illuminate the dial and display sign when material is placed on scale to be weighed.

Listed September 3, 1915.

FIXTURES. — Holloway Brothers Company, Incorporated, 336 West Sixty-Third Street, Chicago, Ill.

Window transparency consisting of a metal inclosure for four standard flashing receptacles, provided with 20-watt lamps for illumination of a painted celluloid sign held between two panes of glass forming front of device. A length of standard armored cord with standard terminal fittings is supplied.

Standard for indoor use only.

Listed September 3, 1915.

PANELBOARDS.—Detroit Fuse and Manufacturing Company, Detroit, Mich.

Detroit ironclad switchboards in which standard, labeled, inclosed switches made by above named manufacturer are assembled to specifications and are mounted on a metal structure in which all current-carrying parts are entirely inclosed.

Listed September 11, 1915.

PICTURE MACHINES AND APPLIANCES.—American Standard Motion Picture Machine Company, 110 West Fortieth Street, New York, N. Y.

"American Standard" projectors; motor-driven motion-picture machines driven by special motors mentioned below, supplied by American Standard Motion Picture Machine Company, and expressly accepted for the purpose.

Direct-current motor, Colonial Fan & Motor Company, 0.1 horsepower, 115 volts.

Alternating-current motor, Universal Fan Motor Company, 0.1 horsepower, 110 volts.

Listed September 15, 1915.

PICTURE MACHINES AND APPLIANCES.—Optigraph Company, 564 West Randolph Street, Chicago, Ill.

Optigraph portable hand-operated motion-picture and stereopticon machine, Type A. The electrical parts of this device comprise an incandescent lamp of special form with standard socket, snap switch, and portable cord for attachment to supply circuit.

Standard for use only with standard slow-burning film supplied by manufacturers.

Listed September 3, 1915.

RECEPTACLES, for Attachment Plugs.—Detroit Fuse & Manufacturing Company, Detroit, Mich.

Fused receptacle for attachment plug, catalog No. 5001.

Attachment plug, catalog No. 5021.

These devices each consist of special porcelain cutout block in two pieces, provided with spring plate contacts inclosed in metal cabinet, and wooden attachment plug having two sliding-plate contacts to slide between contacts of receptacle.

Two-pole, 30 amperes, 250 volts.

Listed August 18, 1915.

RHEOSTATS. — Hatfield Electric Company, Indianapolis, Ind.

Rheostats and panelboard for charging automobile lighting and ignition storage batteries in service stations. Open wire resistance coils mounted on porcelain insulators secured to an angle-iron framework, to which a slate panel is attached carrying knife switches for controlling voltage and current.

Standard for use in automobile service stations when mounted in accordance with National Electrical Code requirements for rheostats and four feet above the floor, or located in a room or inclosure provided for this purpose.

Listed September 3, 1915.

SIGN MACHINES.—Federal Sign System (Electric), Lake and Desplaines Streets, Chicago, Ill.

Motograph sign machine, consisting of motor-operated rolls and idlers, carrying a perforated sheet of fibrous paper which passes between brush and solid contacts, thus making and breaking circuits of lamps in a sign to flash words, or any desired design. The entire device is inclosed in a standard cabinet.

Motor, one-sixth horsepower, 110 volts, alternating current or direct current.

Rating, one-fifteenth-watt lamp per brush, 110 volts.

Standard when wired and installed in a manner acceptable to Inspection Department having jurisdiction.

Listed September 3, 1915.

SWITCH BOXES. — Geometric Stamping Company, 1509 East Fortieth Street, Cleveland, O.

Pressed-steel switch boxes for mounting flush switches and receptacles, and having removable sides to facilitate assembly for use in gangs. "H 501 Catalog G."

Listed August 20, 1915.

SWITCHES, Automatic.—Bristol Time Clock Company, Aberdeen, S. D.

Automatic time switch, 30 amperes, 250 volts.

This device consists of an asbestos-lined case, inclosing an eight-day, 24-hour clock mechanism, arranged to operate three standard double-pole labeled snap switches.

Listed August 25, 1915.

SWITCHES, Automatic. — G. L. Time Switch Company, 3419-21 Rutger Street, St. Louis, Mo.

Automatic electric time switch, 10 amperes, 250 volts.

This device consists of a wood case, inclosing an eight-day, 24-hour clock mechanism arranged to operate a standard, labeled surface snap switch.

Listed August 20, 1915.

SWITCHES, Push-Button Flush.—The Arrow Electric Company, 630 Capitol Avenue, Hartford, Conn.

Arrow E switches, standard and labeled.

Single-pole, 5 amperes, 25 volts, 10 amperes, 125 volts, catalog No. 6800.

Double-pole, 10 amperes, 250 volts, catalog No. 6801.

Three-way, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog No. 6802.

Also above types with lock attachment.

Listed August 13, 1915.

SWITCHES, Pendant Snap.—The Connecticut Electric Manufacturing Company, Bridgeport, Conn.

Single-pole, 3 amperes, 250 volts, 6 amperes, 125 volts, catalog Nos. 11015-22, inclusive.

Listed September 14, 1915.

SWITCHES, Surface Snap.—The Connecticut Electric Manufacturing Company, Bridgeport, Conn.

Single-pole, 3 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 13000, 13010.

Listed August 28, 1915.

Current Electrical News

ATLANTIC STATES.

EAST AURORA, N. Y.—The taxpayers will soon be asked to vote upon the subject of a new system of lighting the village streets. Fifty-two lamps of 250-candlepower each will displace the 35 lights of 60 candlepower now in use, if the project is not vetoed by the property owners. The cost will be approximately $6,000. Address Mayor Brotherhood.

PAULSBORO, N. J.—The Board of Education will soon start on the construction of a large modern school building here. Clyde S. Adams is the architect.

WESTVILLE, N. J.—A complete sand-handling plant, consisting of elevators, screens, storage bins, etc., will be constructed here by the West Jersey Sand & Gravel Company. Manwaring & Cummings, Philadelphia, are the engineers in charge.

POTTSTOWN, PA.—A thoroughly modern ice-cream plant is being planned for William S. Markly, in this city. Lachman & Murphy are the architects.

SOUTH BETHLEHEM, PA.—Several million dollars will be spent by the Bethlehem Steel Company to erect on the 65 acres of land recently acquired on the site of the village of Shimersville, a large plate mill, a battery of furnaces and the buildings to house the Bettendorf Car Works to be moved from its present location in Davenport, Iowa. Practically all operations now taking place in the steel mills are made electrically so it is thought that the new plant will be entirely electrified. E. G. Grace is president.

YORK, PA.—By reason of a large bequest, this city will shortly begin the construction of a $500,000 library building.

BALTIMORE, MD.—Henry Hess, formerly of the Hess-Bright Manufacturing Company, of Philadelphia, and a number of Baltimore capitalists will shortly start the construction of a $1,000,000 plant here for the production of high-grade steel products to be manufactured by the electrical process. The Baltimore Trust Company, the United States Fidelity and Guaranty Company and the Consolidated Gas, Electric Light and Power Company are interested.

BALTIMORE, MD.—The Public Service Building Company will erect a 12-story brick, stone and steel office building here. Parker, Thomas & Rice are the architects.

ACWORTH, GA.—Acworth city authorities have voted to install a new system of waterworks and electric lights. The present system will be abandoned entirely. All-day and all-night electric current will be maintained for motive and lighting current. The water for the city will be pumped from artesian wells by electric motors. Address Mayor George L. Lemon.

NORTH CENTRAL STATES.

CINCINNATI, O.—C. E. Schaffner has awarded to Fischer Brothers the contract for the installation of all electrical equipment in his new apartment building, to cost $75,000. L.

BICKNELL, IND.—A stock company, to have $1,000,000 capital stock, has been organized in this city by A. L. Brocksmith, superintendent of the Bicknell Light and Power Company. The company expects to build a power station at Apraw Falls, on White River, two miles south of this city, and provide power for coal mines operating in this field. It also intends to build an electric line connecting the mines.

URBANA, ILL.—Plans have been prepared for a 1,000-light system which the board of local improvements is contemplating for the entire western section of Urbana. Address A. M. Lindley, president.

GRAND MARIAS, MINN.—A petition is being circulated for an electric light plant. Address town clerk.

CORWITH, IOWA.—Bonds have been voted for an electric light plant. Address city clerk.

WEST UNION, IOWA.—The Turkey River Power Company will make extensive improvements, to include a 300-kilowatt generating unit, water wheels and generator. Cost $20,000.

POPLAR BLUFF, MO.—Sealed proposals will be received by H. H. Wilcox, city clerk, Poplar Bluff, Mo., up to 2 p. m. November 3, 1915, for the construction of a municipal electric light and power plant. Fuller-Coult Company, engineers, St. Louis, Mo. Bond issue of $75,000 sold.

COOPERSTOWN, N. D.—The city council is considering plans for improvements to the electric light system. Address city clerk.

BUCKLIN, KANS.—The council will expend $10,000 for an electric lighting system. Address town clerk.

SOUTH CENTRAL STATES.

MAYFIELD, KY.—A bond issue for purchase of the local water and light plants will be voted on at the coming election. The American Appraisal Company recently appraised the properties at $161,000 and the city is having an audit of the books made. As the first step in the direction of a white way the city council has ordered that all wooden awnings built out over the sidewalks shall come down. The one-light unit plan has been adopted as more efficient than any other. The contract for furnishing the posts was let to the Ornamental Foundry Company, Anniston, Ala., at $23.40 a post, less the cost of wiring and the globe. The post is a patented two-piece post. G.

EARL, ARK.—Memphis people are investing $30,000 in the purchase of the Crittenden Power Company, at Earl, Ark. J. F. Freeman, former manager of the Railway Ice Company, Memphis, negotiated the deal. John F. Rhodes and H. A. Morrison, were the former owners. The concern under the new regime will be known as the Earl Light, Power and Ice Company. G.

WOMBLE, ARK.—The city council has granted a franchise to the Black Springs Lumber Company to supply Womble with electric lights. The company already has a plant at the lumber mill, and the lights will be in service as soon as the poles and wires can be erected.

GREENVILLE, TEX.—The City of Greenville has ordered lights and equipment for a "White Way." The lights will extend over a distance of nearly one-half mile and will be suspended by what is known as the Greenville bracket, a special attachment which was first tried out by the company in this city. The lights will be installed at once.

GATESVILLE, TEX.—Governor Ferguson has granted a deficiency of $10,000 for the erection of an up-to-date heat and power plant for the State Training School for boys near Gatesville. The erection of the new plant will be under the personal supervision of Pat Bracken, master mechanic of the state penitentary.

PLAINVIEW, TEX.—The Malone Light and Power Company will extend its high-voltage electric transmission line to Hale Center and Abernathy for the purpose of supplying those towns with electric current for lighting and power. A number of irrigation pumping plants will also be furnished with power. D.

WACO, TEX.—The plan of having a system of ornamental street lighting here, which has been handled by the Young Men's Business League, has been given a new impetus as a result of efforts made by President W. W. Naman, of the league, who is chairman of the white way committee. An active campaign to secure the lights will be made within the next few weeks.

WESTERN STATES.

ESCONDIDO, CAL.—A resolution has been passed by the city council calling for a bond election for $50,000 for the construction of a municipal electric and gas plant.

REDWOOD CITY, CAL.—The citizens of San Bruno have voted for a lighting district.

ALBANY, ORE.—William Hoflich has applied for a franchise to construct a power plant here and furnish the city with electricity for light and power purposes.

BAKER, ORE.—The Baker Mines Company, to add to the efficiency of its plant at Cornucopia, plans the installation of a small hydroelectric power plant for the operation of milling machinery and an air compressor. The company plans generating between 400 and 500 horsepower. The work of construction includes the installation of a 10,000-foot pipe line, to tap the east fork of Pine Creek; two water wheels, etc. Reported work will probably start on the project sometime early in November. O.

SEWARD, ALASKA.—It is reported the city council has granted the Seward Electric Light & Power Company a franchise to operate an electric light plant and to furnish this city and residents with light and power. According to the terms of the franchise, the city of Seward may, if it so desires, purchase the property after 20 years at a price to be fixed by a board of appraisers. O.

PROPOSALS.

NAVY ELECTRICAL SUPPLIES.—The Bureau of Supplies and Accounts, United States Navy Department, Washington, D. C., will receive bids on October 19, 1915, for the following material: 6,300 feet interior communication cable; 1,300 feet rat tail, rubber-insulated wire; miscellaneous single and twin conductor wire; schedule No. 8869, all for delivery at Navy Yard, Brooklyn, N. Y.; miscellaneous interior communication cable; miscellaneous lighting and power wire; schedule No. 8862, both for delivery at Navy Yard, Philadelphia, Pa.; 6,650 feet single-conductor cable; schedule No. 8857, for delivery at Navy Yard, Washington, D. C.; three 125-horsepower induction motors, schedule No. 8859, for delivery at Navy Yard, Washington, D. C.; 25 one-quarter horsepower portable ventilating sets, schedule No. 8871, for delivery at Navy Yard, Brooklyn, N. Y.

NAVY ELECTRICAL SUPPLIES.—Sealed proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until October 19, for furnishing the following materials. Firms interested should make application to the Bureau, giving the schedule numbers desired. Schedule 8832, single-boat-type electric heater; schedule 8845, storage-battery truck; schedule 8847, electrically illuminated sextants. Bids will be received until October 26 for the following: Schedule 8857, single-conductor cable; schedule 8859, cupro-nickel shell bands, 600-pound crucibles, and 125-horsepower induction motors; schedule 8861, electric blue-printing machine; schedule 8862, interior-communication cable and lighting and power wire; schedule 8869, interior-communication cable, rubber-insulated rat-tail wire, and single and twin-conductor wire. Bids will be received November 2 for the following: Schedule 8854, dry cells; schedule 8877, 75-kilowatt, oil-cooled transformers; schedule 8878, electric welding outfit. Bids will be received until November 9, 1915, for schedule 8865, water-tight annunciators, circuit-breakers, general-alarm boat-hour gongs, contact-makers, etc., alarms, electric whistle outfit, electric docking telegraphs, and thermostats. Bids will be received until November 30 for schedule 8876, portable transmitting and receiving radio sets.

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 18,481. ENGINEERING REPRESENTATIVES.—An American consular officer in Brazil reports that a firm of civil and electrical engineers has just begun business in his district and desires to be placed in communication with American exporters. The firm desires to make a specialty of the sale of American goods. Correspondence may be in English. Quotations should be made c. i. f. Santos, Brazil.

NO. 18,558. ELECTRIC-LIGHT ACCESSORIES.—An American consular officer in the United Kingdom reports that a firm in his district desires catalogs and price lists from manufacturers of brass parts for electric-light accessories. Samples accompany the report and may be examined at the Bureau and its branch offices. (Refer to file No. 66,372.)

NO. 18,625. ARC-LAMP CARBONS, ETC.—An American consul in the United Kingdom reports a good market for arc-lamp carbons, chemical supplies, doorbells, etc. Further information may be obtained from the Bureau or its branch offices.

NO. 18,634. ELECTRIC ELEVATORS, ETC.—An American consular officers in France reports that an agent desires to enter into commercial relations with manufacturers of electric elevators and supplies, and to obtain, as soon as possible, catalogs and price lists. Correspondence may be in English.

NO. 18,652. X-RAY MACHINES.—An American consular officer in Italy reports that a doctor in his district desires to receive catalogs and prices of X-ray machines. Prices, if possible, should be given c. i. f. Palermo. Correspondence should be in Italian.

NO. 18,662. MACHINERY.—A report from an American consular officer in India states that a company desires to receive full information in regard to machinery for an ice plant, an aerated-water factory, and a mill for extracting oil from copra and sim sim (sesame). All the machinery to be driven by electric power generated by means of oil engines, which are also to be purchased. Detailed correspondence is solicited and not catalogs.

NEW INCORPORATIONS.

DEMPSTER, S. D.—The Dempster. Light and Power Company has been incorporated with a capital of $2,500, by John G. DeWahl and others.

VOLIN, S. D.—The Citizens Light and Power Company has been incorporated for the purpose of installing and operating an electric light system in this city.

ORANGE, N. J.—Selah Electric Company; to deal in electric motors; capital stock, $125,000. Incorporators: L. M. Sanders, F. L. Green, W. R. Hinsdale, all of Newark.

TUCKERMAN, ARK.—Articles of incorporation have been filed by the Citizens' Light and Power Company. The company is capitalized at $10.000, and was incorporated by L. D. Smith, L. T. Slayden and William Laner.

NEW YORK, N. Y.—S. & H. Electrical Company, Incorporated. Electrical construction, etc. Capital, $2,000. Incorporators: Reuben Simon, Edward J. Hussman and Edward Nimark.

NEW YORK, N. Y.—Arc Welding Machine Company, Incorporated. Electric welding plants. Capital, $10,000. Incorporators: Cyril G. Ballin, Edward N. Matthews and George L. Robinson.

LOUISVILLE, KY.—The City Sign Company, $250 capital, has been incorporated in Louisville, to make and sell electric and other signs. S. C. Bewley, William T. Johnston, and G. H. Kirn are the incorporators. G.

GLEN HOPE, PA.—The Glen Hope Light, Heat and Power Company has been incorporated with a capital of $5,000, by Warren Partridge, W. O. Hoover and J. P. O'Laughlin. The offices of the company will be located at Clearfield.

CHICAGO, ILL.—The Guaranteed Appliance Company has been incorporated. The company's capital stock is $5,000, and it is to manufacture and deal in electrical appliances. The incorporators are Prescott D. Bennett, Reuben N. Trane and Dudley Taylor. Z.

CISNE, ILL.—The Cisne Electric Light Company has been licensed to incorporate. The company's capital stock is $5,000. It is to supply light and power to the inhabitants of the village of Cisne, Ill. C. B. Clay, Nellie Clay and John H. Brown are the incorporators. Z.

WILMINGTON, DEL.—The Eureka Automatic Signal Company, with a capital of $350,000, has been incorporated to acquire patents of all kinds and to develop same. Dallett H. Wilson, Bethlehem, Pa., Mary Z. Bradshaw, Easton, Pa., and Ellen Z. Breed, Cleveland, O., are the incorporators.

FINANCIAL NOTES.

The Central Trust Company, Kuhn, Loeb & Company and Kidder, Peabody & Company, New York, who privately opened subscriptions for the new issue of $20,000,000 Brooklyn Rapid Transit Company five-per-cent secured notes, announce that the entire amount has already been over-applied for.

Dividends.

	Term	Rate	Payable
Brooklyn City R. R.	Q	2 %	Oct. 15
Edison Co. of Boston	Q	$3.00	Nov. 1
Grand Rapids Ry., pf.	Q	1.25%	Nov. 1
Montreal Tramways	Q	2.25%	Oct. 15
Ottumwa Ry. & Lt., pf.	Q	1.75%	Oct. 15
Pub. Serv. Investment, pf.	Q	$1.50	Nov. 1
West Penn. Rys., pf.	Q	1.25%	Nov. 1
Western States Gas & Elec., pf.	Q	1.75%	Oct. 15

Reports of Earnings.

ILLINOIS TRACTION.

Consolidated earnings of Illinois Traction Company and Western Railways & Light Company for the three months and the twelve months ended June 30, 1915, shows:

	1915	1914
Three months gross	$2,601,804	$2,723,871
Net after taxes	973,292	1,020,441
Surplus after charges	146,995	196,259
Balance after preferred dividends	39,962	89,226
12 months gross	11,141,880	10,994,565
Net after taxes	4,586,748	4,502,638
Surplus after charges	1,261,554	1,415,627
Balance after preferred dividends	833,424	991,949

PHILADELPHIA COMPANY.

Duquesne Light Company:

	1915	1914
August gross	$ 384,086	$ 348,314
Net after taxes	179,267	114,259
Five months gross	1,957,188	1,906,287
Net after taxes	934,060	746,048

Pittsburgh Railways Company:

August gross	$1,008,012	$1,007,037
Net after taxes	358,797	289,180
Five months gross	5,028,593	5,135,477
Net after taxes	1,820,702	1,545,197

LEHIGH VALLEY TRANSIT.

	1915	1914
August gross	$ 198,668	$ 182,931
Net after taxes and depreciation	92,068	78,471
Total income	103,137	88,525
Surplus after charges	47,831	34,580
12 months gross	1,594,922	1,863,030
Net after taxes and depreciation	790,984	714,795
Total income	921,625	845,978
Surplus after charges	260,445	207,142

BRAZILIAN TRACTION, LIGHT & POWER.

(Earnings in Milreis.)

	1915	1914
July gross	6,703,000	6,462,860
Net after taxes	3,900,000	3,723,790
Seven months gross	44,387,110	42,907,048
Net after taxes	25,843,420	24,562,598

CONSOLIDATED GAS, ELECTRIC LIGHT & POWER.

Baltimore—Consolidated Gas, Electric Light & Power Co. reported income account for the fiscal year ended June 30, 1915, as follows:

	1915	1914
Gross earnings	$6,789,402	$6,400,896
Expenses and taxes	3,576,583	3,333,825
Net earnings	3,212,819	3,067,065
Fixed charges	1,640,361	1,567,689
Surplus	1,572,457	1,499,385
Dividends	1,064,629	891,562
Balance	507,829	607,823
Net to profit and loss after special resources	47,828	22,823

Operating expenses and taxes do not include new business and extraordinary expenses amounting to $300,000 in 1914 and $125,000 in 1915 and charged to reserve for new business campaign and extraordinary expenses in each year.

VIRGINIA RAILWAY & POWER.

	1915	1914
August gross	$442,699	$446,198
Net after taxes	221,544	236,299
Total income	229,014	242,779
Surplus after charges	85,083	105,257
Balance after depreciation	76,750	96,924
Two months gross	891,556	890,014
Net after taxes	454,571	467,879
Total income	470,700	480,773
Surplus after charges	183,395	206,852
Balance after depreciation	166,728	190,186

GEORGIA RAILWAY & POWER.

	1915	1914
August gross	$ 498,869	$ 527,950
Expenses and taxes	295,061	318,481
Net earnings	203,808	209,468
Eight months gross	4,170,522	4,140,887
Expenses and taxes	2,450,338	2,426,691
Net earnings	1,720,184	1,714,196

DAYTON POWER & LIGHT COMPANY.

	1915	1914
August gross	$ 80,498	$ 71,823
Net	40,429	31,800
Surplus after charges	22,294	14,498
12 months gross	1,011,708	904,192
Net	474,499	405,227
Surplus after charges	259,820	200,059

GREAT WESTERN POWER.

(Western Power Corporation Subsidiary.)

	1915	1914
August gross	$ 244,583	$ 225,515
Net after taxes	169,910	154,915
Total income	187,155	174,155
Surplus after charges	80,400	73,093
Balance after dividends California Electric Generating, pf.	67,900	60,593
Eight months gross	1,887,723	1,752,590
Net after taxes	1,326,931	1,146,387
Total income	1,463,485	1,294,821
Surplus after charges	619,857	499,159
Balance after dividends on California Electric Generating preferred	519,857	399,159

REPUBLIC RAILWAY & LIGHT.

	1915	1914
August gross	$ 260,792	$ 255,488
Net after taxes	102,494	100,431
Total income	102,637	100,519
Interest charges	58,560	57,063
Preferred dividends	25,957	25,957
Surplus	18,121	17,499
Eight months gross	1,968,619	2,003,459
Net after taxes	750,027	771,554
Total income	751,099	772,788
Interest charges	459,648	450,112
Preferred dividends	207,656	207,656
Surplus	83,795	115,021

COMMONWEALTH POWER, RAILWAY & LIGHT.

	1915
August gross	$ 1,181,948
Net earnings	597,055
Surplus after charges	160,262
Balance after preferred dividends	80,262
Eight months' gross	9,202,661
Net earnings	4,763,763
Surplus after charges	1,340,906
Balance after preferred dividends	700,906
Twelve months' gross	14,088,122
Net earnings	7,318,052
Surplus after charges	2,188,966
Balance after preferred dividends	1,228,966

CALIFORNIA TELEPHONE & LIGHT.

California Telephone & Light Company for twelve months ended August 31, 1915, reported earnings as follows:

	1915	1914
Gross earnings	$125,040	$114,261
Net after taxes	55,082	47,048
Surplus after charges	30,851	24,714
Balance after amortization, depreciation and preferred dividends	6,333	2,345

NORTHERN OHIO TRACTION & LIGHT.

	1915	1914
August gross	$ 360,055	$ 343,543
Net after taxes	145,496	141,698
Surplus after charges	92,177	90,561
Balance after preferred dividends	75,798	75,456
Eight months' gross	2,488,442	2,416,902
Net after taxes	952,533	949,252
Surplus after charges	538,945	545,432
Balance after preferred dividends	408,263	425,105

PUGET SOUND TRACTION, LIGHT & POWER.

	1915	1914
July gross	$ 664,564	$ 726,373
Net after taxes	262,427	303,217
Surplus after charges	80,886	125,335
Twelve months' gross	7,846,587	8,691,638
Net after taxes	3,041,789	3,626,047
Surplus after charges	886,359	1,524,160

PORTLAND RAILWAY LIGHT & POWER.

	1915	1914
August gross	$ 460,861	$ 487,264
Net after taxes	203,278	211,350
Surplus after charges	16,771	25,164
Twelve months' gross	5,668,404	6,575,622
Net after taxes	2,583,578	3,239,563
Surplus after charges	372,722	1,098,418

PACIFIC LIGHT & POWER CORPORATION.

	1915	1914
August gross	$ 263,833	$ 234,014
Net after taxes	185,129	160,057
Total income	194,249	172,285
Surplus after charges	86,631	63,148
Eight months' gross	1,906,859	1,734,019
Net after taxes	1,277,661	1,022,107
Total income	1,360,977	1,139,048
Surplus after charges	499,462	315,900

COLUMBUS RAILWAY, POWER & LIGHT.

	1915	1914
August gross	$ 242,299	$ 243,564
Net after taxes	88,727	87,447
Surplus after charges	48,495	47,254
Twelve months' gross	3,056,293	3,066,923
Net after taxes	1,242,567	1,113,970
Surplus after charges	771,668	633,893
Balance after preferred dividends	486,545	348,770

CUMBERLAND COUNTY POWER & LIGHT.

	1915	1914
August gross	$ 285,383	$ 272,799
Net after taxes	144,984	144,022
Surplus after charges	79,981	80,558
Twelve months' gross	2,567,923	2,491,684
Net after taxes	1,102,672	1,058,171
Surplus after charges	322,398	295,435
Balance after preferred dividends	184,398	157,435

PERSONAL MENTION.

MR. CHARLES KNAPP CREGIER, assistant chief electrical inspector of Chicago, was married on October 9 to Miss Evelyn Atkins, of Chicago. Mr. Cregier is a son of former Mayor DeWitt C. Cregier of Chicago and has been connected with the Bureau of Electrical Inspection for many years. During recent years he has been developing at odd times a system for synchronizing motion-picture and phonograph machines so as to produce a true talking motion picture.

MR. ALFRED J. HIXON, president-elect of the Massachusetts Electrical Contractors' Association, is a native of San Jose, Cal., where he was born in 1876. Removing to Chicago in 1892 he entered electrical work as a practical electrician. Here he remained until 1899, when he came to Boston, working ten years for an electrical contracting firm, a large part of the time as foreman and superintendent. He then entered business for himself, establishing the contracting firm of the Hixon Electric Company, Summer Street, Boston, he being its president and treasurer. Besides this extensive business, Mr. Hixon has other interests along allied lines. He is a member of the Boston Athletic Association and several other organizations. His home is in Braintree, Mass.

MR. H. W. BRUNELL, for the past four years power engineer for the Pennsylvania Utilities Company, of Easton, Pa., has terminated his services with that company and will hereafter be connected with a large power corporation in New York City. Mr. Brunell went to Easton from Oklahoma, where he was chief engineer for the H. M. Byllesby Company. One of his main achievements while connected with the Pennsylvania Utilities Company was the building of the high-tension line between the hydro-electric station at Stroudsburg and the Delabole substation. This line, erected in January of this year, was completed in 30 days, which is regarded as an especially splendid piece of work. Mr. Brunell was also instrumental in furthering the electrification of many of the quarries in the Slate Belt, to accomplish which he invented several devices which have proved a great saving in the operation of this important industry.

OBITUARY.

MR. ROBERT WAGNER, superintendent of the Laporte City Public Utility Company, died on October 6, at Waterloo, Iowa. Mr. Wagner was prominent in electrical and community interests and held the position of superintendent at Laporte City for many years.

DATES AHEAD.

Electric Vehicle Association of America. Annual convention, Cleveland, O., October 18-19. Executive secretary, A. J. Marshall, 29 West Thirty-ninth Street, New York, N. Y.

Association of Railway Electrical Engineers. Annual convention, Hotel La Salle, Chicago, Ill., October 18-22. Secretary, J. A. Andrucetti, Chicago & Northwestern Railway Company, Chicago, Ill.

American Institute of Electrical Engineers. Planters Hotel, St. Louis, Mo., October 19-20. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York, N. Y.

Kansas Gas, Water, Electric Light and Street Railway Association. Annual convention, Topeka, Kans., October 21-23. Secretary, Ivor Thomas, 237 South Main Street, Wichita, Kans.

American Physical Society. Columbia University, New York City, October 30. Secretary, A. D. Cole, Columbus, O.

Mississippi Electric Association. Annual convention, Hattiesburg, Miss., November 12-13. Secretary, H. F. Wheeler, Hattiesburg, Miss.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Oct. 11	Oct. 4
American Tel. & Tel. (New York)	123⅞	123⅜
Commonwealth Edison (Chicago)	136	136½
Edison Electric Illuminating (Boston)	241	240
Electric Storage Battery common (Philadelphia)	73	74
Electric Storage Battery preferred (Philadelphia)	73	74
General Electric (New York)	176	177½
Kings County Electric (New York)	120	120
Massachusetts Electric common (Boston)	8	8¾
Massachusetts Electric preferred (Boston)	38	42
National Carbon common (Chicago)	150	158
National Carbon preferred (Chicago)	120	120
New England Telephone (Boston)	131½	132
Philadelphia Electric (Philadelphia)	25¾	25
Postal Telegraph and Cables common (New York)	76¼	78
Postal Telegraph and Cables preferred (New York)	65⅞	65½
Western Union (New York)	49	76⅞
Westinghouse common (New York)	133¼	137¾
Westinghouse preferred (New York)	149	146

With the Electrical Manufacturers

James G. Biddle, 1211 Arch Street, Philadelphia, Pa., is sending out cards calling attention to his line of megger sets for insulation testing. The Jagabi hand tachoscope, or speed indicator, is also illustrated.

Harvey Hubbell, Incorporated, Bridgeport, Conn., has ready for distribution another folder on the Hubbell duplex wall receptacle that provides two outlets, each rated at 6 amperes, 250 volts.

Minerallac Electric Company, Chicago, Ill., has issued bulletin No. 70, which describes and illustrates the new Minerallac balanced disconnect switch, showing its advantages over the older types.

The Trumbull Electric Manufacturing Company, Plainville, Conn., has devoted the October number of its monthly house organ, "Trumbull Cheer," to the Jovian Order and the principle of co-operation for which it stands. A special Jovian marching song has been composed by Trumbull Tem, all in honor of the thirteenth Jovian congress.

Page & Hill Company, Minneapolis, Minn., producer of cedar poles, announces the opening of a Chicago office at 19 South La Salle Street. The office will be under the management of E. C. Stockdale, formerly connected with the Stone & Webster Engineering Corporation, having been identified with the Keokuk hydroelectric development and other of its projects.

The Usona Manufacturing Company, Inc., maker of "Kwik-Lite" products, announces the opening of a new branch office and warehouse, in the Wells-Fargo Building, San Francisco, Cal. A complete stock of "Kwik-Lite" cases, batteries and lamps will be carried at this branch, so that prompt service may be given the Pacific Coast states. The San Francisco office is the fourth to be opened since last February by the company, the other three being in New York City, Toledo, O., and Windsor, Can.

King Foundry Company, St. Joseph, Mo., is sending out folders calling attention to four specially attractive, low-price offers, good in October, applying to ornamental single-light standards complete with globes and various sizes and types of high-efficiency lamps, all ready to set up and connect to the circuit. The advantages of ornamental lighting to mercantile establishments, banks, business blocks, etc., are pointed out. The company also has ready for distribution an 18 by 30-inch wall chart on which are shown 32 of the company's attractive single-light and cluster standards. This should be of value to contractors and central stations.

Wagner Electric Manufacturing Company, St. Louis, Mo., has recently published some new bulletins, of which No. 109 describes single-phase rotary converters for motion-picture projection; the characteristics and advantages of this machine are set forth and views are given of typical sets and of theaters in which they are used. Bulletin No. 110 is similarly devoted to single-phase motors of the types BA and SA. Bulletin No. 111 likewise treats of polyphase motors, and bulletin No. 112 of generators and synchronous motors.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., published a very attractively illustrated folder dealing with its exhibits at the Panama-Pacific International Exposition for the special use of those attending the convention of the American Electric Railway Association last week. The railway exhibits were specially featured and the grand prizes awarded emphasized. Another special publication is No. 1562, entitled "Railway Equipments and Locomotives in the Far West"; this is a 48-page, beautifully illustrated book describing the electric railway systems in the West for which the company furnished electrical equipment.

Record of Electrical Patents

Issued by the United States Patent Office, October 5, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,155,338. **Detectometer.** A. G. Carlson, North Easton, Mass. For wireless system; indication is amplification of amount of adjustment necessary to restore most favorable operative position of rectifying mineral and member pressing thereon, after disestablishment thereof.

1,155,345. **Means for Smoothing and Ironing the Insulating Wrapping of Electric Conductors.** A. Finckbein, assignor to Siemens-Schuckertwerke G. M. B. H., Berlin, Germany. Apparatus for compressing and drawing tight the insulation on a conductor by an ironing action.

1,155,346. **Tachometer-Magnet and Mount for the Same.** T. J. Fischer, assignor to Stewart-Warner Speedometer Corporation, Chicago, Ill. Magnet in form of split ring with temperature compensator.

1,155,350. **Attachment of Electrical Fixtures to Outlet Boxes.** H. R. Gilson and J. M. G. Fullman, assignors to National Metal Molding Co., Pittsburgh, Pa. Box is provided with lugs and spanner for supporting fixture.

1,155,358. **Process of Manufacturing Articles Out of Highly Refractory Material.** P. M. Hulbert, Detroit, Mich. Carbon heating resistances are protected by embedding in comminuted, nonoxidizable, refractory material, integration thereof being produced by heating.

1,155,364. **Electric Switch.** J. F. Monnot, Paris, France. Fluid-pressure-operated snap switch.

1,155,372. **Ignition Device for Internal-Combustion Engines.** L. T. Rhoades, assignor to New York Coil Co., New York, N. Y. Cam circuit-breaker controlled by centrifugal device.

1,155,373. **Track Instrument.** J. S. Romig, Altoona, Pa. Rail-operated liquid-immersed contactor.

1,155,384. **Electrical Meter.** H. Tolle, assignor to Siemens-Schuckertwerke G. M. B. H. Alternating-current meter of the Ferraris type.

1,155,415. **Lightning-Arrester.** J. T. Greene, assignor to National Electric Specialty Co., Toledo, O. Vacuum tube type.

1,155,423. **Electric Flatiron.** W. J. Keep, assignor to Michigan Stove Co., Detroit, Mich. Arrangement of heating unit, housings, etc.

1,155,426. **Method of Making Contact Bodies of Tungsten.** A. J. Liebmann and W. A. Megrath, assignors to Independent Lamp & Wire Co., New York, N. Y. Tungsten plate welded electrically to a support, resistance-increasing material being placed between plate and support.

1,155,427. **Contact Bodies of Tungsten.** A. J. Liebmann and W. A. Megrath, assignors to Independent Lamp & Wire Co. Face plate of tungsten welded to support of iron or steel.

1,155,443. **Process of Manufacture of Impregnated Material.** J. Rosen, assignor to Societe Anonyme des Combustibles Industriels, Paris, France. Insulating, impregnating material made from coal tar.

1,155,448. **Electric Plate-Condenser.** G. Seibt, assignor to General Transmission Co., New York, N. Y. Stationary parallel plates are sandwiched with movable plates integral with their carrier.

1,155,460. **Armor for Flexible Articles.** C. Barbour, assignor to Standard Underground Cable Co., Pittsburgh, Pa. Double layer of helical wire of different pitches forms armor for cable.

1,155,466. **Electric-Display Switching Mechanism.** E. H. Bickley, assignor to Motograph Co. of America, Detroit, Mich. Lamp bank of traveling-word sign, controlled by ribbon carrying interchangeable contacts.

1,155,476. **Safety Apparatus for Railways.** T. M. Freeble, Rochester, Pa. Arrangement of insulated track sections in block system.

1,155,477. **Manual Actuator for Railway-Signals.** T. M. Freeble, assignor of one-half to R. M. Kaufmann, Pittsburgh, Pa. Device for electrically bridging rails.

1,155,478. **Safety Apparatus for Railway Trains.** T. M. Freeble. Track trip (operated according to track conditions) operates device on car to indicate permissive speed and distance traveled; also automatic reduction, if speed exceeds permissive.

1,155,480. **Range.** W. S. Hadaway, Jr., New Rochelle, N. Y. Interchangeable heat units, each comprising radiant electric heater and heat-absorbing slab, arranged for oven and stove top.

1,155,481. **Regulator for Laundry Rolls.** W. S. Hadaway, Jr. Automatic regulation of heat imparted to roll by stationary electric heater.

1,155,482. **Heat-Regulating System.** W. S. Hadaway, Jr. For type-setting machine crucibles; comprises immersion and outlet heaters with provision for regulation.

1,155,483. **Electric Heater.** W. S. Hadaway, Jr. Slab of heat-absorbing material heated by radiation from electric heater.

1,155,484. **Motor-Control System.** J. H. Hall, assignor to Electric Controller & Mfg. Co., Cleveland, O. Dynamic braking with supply and braking-circuit switches electromagnetically interlocked.

1,155,494. Toaster. J. F. Lamb, assignor to Landers, Frary & Clark, New Britain, Conn. Electric heater unit is readily removable.

1,155,496. Automatic Control Device for Illuminating Apparatus. C. G. Lindblom, assignor to Aktiebolaget Lux, Stockholm, Sweden. Electric thermopile operates automaticaly to light and extinguish illuminating apparatus.

1,155,497. Electric Welding Machine. W. C. Lindemann and K. D. Camp, assignor to A. J. Lindemann & Hoverson Co., Milwaukee, Wis. Driving connections for moving the movable electrode in a spot welder.

1,155,500. Co-Ordinating Actuating Means for Magnetos and Igniters of Internal-Combustion Engines. T. C. Menges, assignor to Associated Manufacturers Co., Waterloo, Iowa. Particular structure of gearing for purpose indicated.

1,155,501. Recording Instrument. C. R. Moore, LaFayette, Ind. Electromagnetically operated punch for recording ribbon.

1,155,502. Electromagnet. C. R. Moore. Core in insulated sections, circuit for coil being made through the sections and armature hinged to one section and making and breaking contact with other.

1,155,512. Primary Battery. A. L. Saltzman, assignor to New Jersey Patent Co., West Orange, N. J. Manner of supporting plates.

1,155,514 and 1,155,515. Spark Plug. A. Schmidt, assignor to Champion Ignition Co., Flint, Mich. First patent: configuration of sparking point and manner of securing to plug casing. Second patent: relates to securing of insulation in casing.

1,155,521. Magneto-Electric Machine. F. R. Simms, assignor to Simms Magneto Co., Bloomfield, N. J. Has two armatures for generating separate lighting and ignition currents.

1,155,535. Train-Controlled Electric Recording Crossing-Signal. H. Wilkins, assignor to W. H. Redman, W. M. Smith and J. P. Wilson, Vanderburg County, Ind. Clock-operated record and train-controlled marker.

1,155,547. Electric Signaling System. A. H. Bull, Brooklyn, N. Y. Desired one of several receivers on line selected by arrangement of impulses.

1,155,560. Treatment of Seed Grain. H. E. Fry, assignor to C. E. DeWolf, London, England. Grain placed in solution of manure, heated, current passed through it and then sprayed with mineral oil.

1,155,578. False-Alarm-Preventing Device. J. Janik, Plymouth, Pa. Hand of operator is gripped and held fast.

1,155,593. Electrical Heater. A. W. Mansbridge, Winnipeg, Man., Canada. Heating element adjustable to radiate through front to form radiator or to heat top to form stove.

1,155,599. Electric Heater for Use in Connection with Water-Cooled Gasoline Automobiles. G. P. Metcalf, St. Paul, Minn. To prevent freezing of circulation system.

1,155,600. Non-Glare Headlight. W. W. Metzger, J. A. Altendorf and C. M. Verrill, Los Angeles, Cal. Lamp in concave reflector is surrounded by translucent bell open at front, but diffusing light transmitted to reflector.

1,155,610. Underground Conduit. J. W. Orrock, assignor of one-half to H. H. Vaughan, Montreal, Canada. Details of structure for supporting and protecting underground conductors.

1,155,626. Switch. H. A. Steen, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. Structure of magnetic blowout.

1,155,640. Impulse-Transmitter for Selective Systems. G. Brown, assignor to Western Electric Co., New York, N. Y. Particular structure of gearing and contacts.

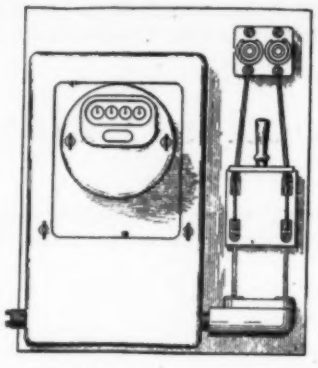
1,155,643. Electric Regulation. J. L. Creveling, assignor to Safety Car Heating & Lighting Co., Newark, N. J. Automatic regulation of generator in car-lighting system, the regulating effect being increased upon intermittent fluctuations of generator output.

1,155,648. Means for Protecting Contents of Oil-Containing Tanks Against Ignition by Electrical Discharge. W. Dodd, Des Moines, Iowa. Tank inclosed by conducing cage connected to it at intervals.

1,155,649. Rectifier Compound. N. Fallek, assignor to Cook Railway Signal Co., Denver, Colo. Compound for use as rectifier comprises sodium phosphate, asbestos, sodium silicate and water.

1,155,650. Thermostatic Control. G. R. Fassett, Lakewood, O. Thermostat blade forms one terminal in a clock-controlled mechanism for closing electric circuit at predetermined intervals.

1,155,653. Method and Apparatus for Utilizing Hertzian Waves. E. R. Gill, assignor to T. McCampbell, Yonkers, N. Y. Electric circuit has series of breaks controlled by detectors successively subjected to wave train.



No. 1,155,742.—Meter-Protecting Device.

1,155,656. Air-Cooled Tank for Electrical Apparatus. I. Harter, assignor to Babcock & Wilcox Co., Bayonne, N. J. Transformer tank has flattened tubes connecting with top and bottom and extending outwardly from its walls.

1,155,672. Telephone-Exchange System. T. G. Martin, assignor to Automatic Electric Co., Chicago, Ill. Automatic, central-energy, intercommunicating, party-line system.

1,155,695. Trolley Guard. J. Zanolli, Pittsburgh, Pa. For preventing wheel from jumping trolley with provision for admitting wire to wheel and permitting passage of stay wires.

1,155,716. Wire Support. A. F. Fest, Audubon, Iowa. Crossarm brace and clamp.

1,155,722. Fire-Alarm System. F. Gottschalk, Stirling, N. J. Fuse link controls telephone receiver hook.

1,155,742. Meter-Protection Device. E. A. Le Fever, Buffalo, N. Y. Meter and connections on base and inclosed by cover scaled to base. (See cut.)

1,155,776. Telegraphone. H. L. Washburn, assignor to American Telegraphone Co., Springfield, Mass. Relates to reeling arrangements for record.

1,155,805. Lighting Fixture. E. F. Guth, assignor to Luminous Unit Co., St. Louis, Mo. Fixture support, etc., combined with junction box. (See cut.)

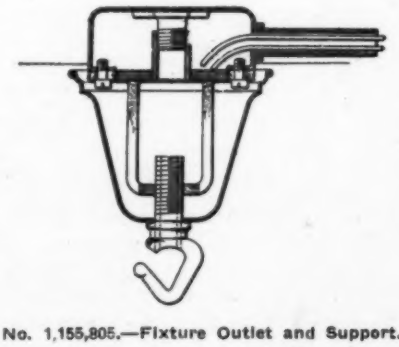
1,155,812 and 1,155,813. Electric Insulation. J. A. Heany, New York, N. Y. First patent: insulating sheath for conductor formed of convolutions of a thread completely and uniformly covered with fibers. Second patent: tape has a foundation cord and an inclosing flattened layer of matted asbestos fibers.

1,155,814. Electric Switch. E. M. Hewlett, assignor to General Electric Co., Schenectady, N. Y. Oil switch adapted to draw arc through aperture into receptacle to cause expulsion of oil and destroy arc.

1,155,817. Car Indicator. H. A. Humphrey, assignor to Safety Elevator Lock & Signal Co., Kansas City, Mo. For elevators; carrier moved synchronously with car controls direction and position-indicating lamps.

1,155,826. Adjustable Resistance. E. C. Larry, assignor to General Railways Signal Co., Gates, N. Y. Simple and compact structure in which resistance is varied by slider contacting with bare convolutions of resistance coil.

1,155,834. Railway and Highway Signaling Device. A. H. Messer, Mankato, Minn. Railway normal-danger and highway normal-clear signals interlocked to operate simultaneously.



No. 1,155,805.—Fixture Outlet and Support.

1,155,835. Electrical Scroll Saw. G. H. Murphy, Balls Ferry, Cal. Particular arrangement of handle, insulation and connections.

1,155,849. Manufacture of Steel. W. R. Walker, New York, N. Y. Molten iron containing manganese is treated in Bessemer or open-hearth furnace, stopping treatment when percentage of manganese is high and treating further in electric furnace.

1,155,870. Locking Mechanism for Elevator Gates. F. Barlow, London, England. Starting and stopping switch controlled by gate catch.

1,155,913. Trolley Wheel. W. S. Griffith, Homer City, Pa. Particular structure of harp and trolley guard released by pull on trolley rope.

1,155,921. Reversible Brush-Holder. G. L. Halvardson, Stockholm, Sweden. Brush ring locked in position by hook controlled by field.

1,155,963. Electric Lamp. O. Schaller, Südende, near Berlin, Germany. Globe of incandescent lamp comprises two parts held together by atmospheric pressure and a liquid seal for the joint, the leading-in wires being disposed in the joint.

1,155,978. Drum Switch with Maximum Cutout. M. Vogelsang, assignor to Voigt & Haeffner Actien-Gesellschaft, Frankfort-on-the-Main, Germany. Has circuit-breaker biased to break held closed by connection with regulating member, the connection being controlled by overload, with provision for locking regulator in position on disconnection.

1,155,985. Centrifugal Switch. H. L. Zabriskie, assignor to Diehl Mfg. Co., Elizabeth, N. J. Structural details of motor switch.

1,156,035. Electrical Transformer System. F. S. Perrin, assignor to Splitdorf Electrical Co., Newark, N. J. Interrupter effect is produced for sparking from direct-current source by feeding the direct current to parallel primaries on a transformer and periodically nullifying its effect by reversing the current in one primary, the secondary feeding the spark gap.

1,156,043. Telegraph System. W. H. Shephard and A. E. McKechnie, London, England. Particular structure of receiving apparatus.

Reissue 13,990. Mechanical Movement and Electric-Light Socket. T. A. C. Both, assignor to Zee Socket & Mfg. Co., Boston, Mass. Original No. 1,040,132, dated Oct. 1, 1912. Details of socket switch.

Patents Expired.

The following United States electrical patents expired on October 11, 1915:

612,009. Process of and Apparatus for Electrolyzing Sea Water. G. B. Baldo, Trieste, Austria-Hungary.

612,015. Lightning Arrester. C. C. Chesney, Pittsfield, Mass.

612,038. Electric Switch. G. W. Hart, Hartford, Conn.

612,049. Arc-Lamp Globe. H. G. Mills, Milwaukee, Wis.

612,062. Trolley Arm. B. R. Shopp, Jr., Jersey City, N. J.

612,063. Switching Mechanism. G. W. Singleton, Syracuse, N. Y.

612,068. Electric Railway. F. D. Sweet, Elyria, O.

612,122. Electrical Converter. F. Schwedtmann, St. Louis, Mo.

612,123. Electrical Connector. F. Schwedtmann.

612,132. Electric Trolley Device. C. L. Jeffrey, Johnstown, Pa.

612,139. Casing for Electric Car-Lighting Apparatus. W. F. Richards, Buffalo, N. Y.

612,146. Electric System of Distribution. J. N. Thomas, Johnstown, Pa.

612,152. Electric-Lamp Socket. F. M. Bell, New York, N. Y.

612,172. Telephone Arm Rest. J. R. McKelvey, Lawrenceville, Ga.

612,192. Hinge Conductor for Electric Currents. F. E. Chandler, Brandon, Vt.

612,203. Controlling Switch for Electric Motors. R. Hutchison, Mobile, Ala.

612,212. Rheostat. E. O. Raster, Chicago, Ill.

612,219. Telephone Central-Station Apparatus. J. H. West, Berlin, Germany.

612,234. Electric Traction Apparatus. R. Demeuse, Brussels, Belgium.

612,236. Circuit-Controller and Receiver Support. L. Duque, Paris, France.

612,250. Process of Electrolytic Separation of Metals. H. von der Linde, Crefeld, Germany.

612,326. Electric Battery. M. E. Euld, Baltimore, Md.

612,330. Telephone Pay Station. W. Gray, Hartford, Conn.

612,344. Underground Electric Railway. C. W. Jenkins, Richmond, Va.

Reissue 11,697. Conduit-Outlet Insulator. F. W. Erickson, Boston, Mass.